2013 ANNUAL REPORT

NPDES/CMOM/LTCP

Lowell Regional Wastewater Utility

April 2014

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LOWELL REGIONAL WASTEWATER UTILITY

WASTEWATER COLLECTION AND TREATMENT

MARK A. YOUNG
EXECUTIVE DIRECTOR

SERVING
LOWELL
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TO: George Harding PE
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205B Lowell Street
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SUBJECT: 2013 Annual Report

DATE: April 10, 2014

Gentlemen:

In conformance with the reporting requirements of NPDES Permit No. MA0100633 and Administrative Order No. 010-026, the Lowell Regional Wastewater Utility (LRWWU) is submitting its 2013 Annual Report for review and comment.

LRWWU's annual report is now comprised of three distinct reports: the annual LTCP Progress Report; the annual CMOM Report; and the annual NPDES Report. The LTCP Progress Report describes initiatives that have been or will be completed to mitigate the discharge of CSOs into local waterways. The CMOM Report details the work done associated with the operation and maintenance of LRWWU's sewer collection system.

This year's annual report coincides with the due date for the Third-Year CMOM Program Self-Assessment Checklist, which is also included in the annual report package. LRWWU is pleased to report that many of the action items that were identified in the original checklist, submitted in 2011, have been addressed.

The NPDES report also includes the annual Infiltration / Inflow (I/I) Report and the annual Combined Sewer Overflow (CSO) Report. The I/I report describes the I/I control actions taken in 2013 and the impact of these actions on I/I rates at LRWWU's Duck Island Wastewater Treatment Facility (WWTF). The CSO report contains wet weather data summaries for 2013 (quarterly and annual summaries), certification statements related to CSO records and structure maintenance, and the annual Nine Minimum Controls (NMC) Report.

This annual report also includes two maps: one that depicts the locations of LRWWU's 2013 SSOs; the other shows the commercial properties located in the LRWWU's combined sewer system. The second map is presented to; please see that report for more details. Both maps address a CMOM requirement.

The data provided in these reports indicate that significant progress has been made in reducing inflow and infiltration into the local sewer system and, as a result, CSO discharges have been substantially decreased.

LRWWU is proud of the accomplishments of its LTCP Phase 1 Program: local sewer surcharging has been nearly eliminated; CSO discharges have been greatly reduced; many miles of new infrastructure have been installed; and infiltration and inflow into the sewer system have been significantly decreased.

Two statistics demonstrate this progress: non-rain related I/I has been reduced by a remarkable 76% since 2006; and the 2013 CSO annual discharges were almost 70% less than the annual average for the past eight years. Here are the actual numbers:

- In 2006, LRWWU reported average non-rain related I/I of 18.2 MGD; the average non-rain related I/I for 2013 is 4.35 MGD.
- The average annual CSO discharge volume in the past eight years is 635 MG; for 2013, the CSO discharge volume was 200 MG.

I hope that you agree that these numbers reflect the outstanding progress that LRWWU has made in recent years. That said, LRWWU recognizes the need for continued improvement with regards to I/I and CSO reduction. This is the primary objective of LRWWU's LTCP Phase 2 Plan, which is currently being developed. The plan will be submitted to you in June 2014.

I look forward to partnering with you as we continue our efforts to improve the water quality in the Merrimack River watershed. If you require any additional information, or if you have any questions, please contact me or Mark Young, the Executive Director of the Lowell Regional Wastewater Utility.

Respectfully,

Michael Stuer
LRWWU Engineering Manager

Copy / File
Mark Young, LRWWU Executive Director
Aaron Fox, LRWWU Maintenance Superintendent
Tom Kawa, LRWWU Operations Superintendent
Shannon Cohan, LRWWU Collection System Supervisor
Evan Walsh, LRWWU Engineering Supervisor
Jack Taylor, LRWWU CMMS Administrator
Carrie Prescott, LRWWU Engineer
Keith Murray, LRWWU Engineer
John Pugh, LRWWU Engineer

Lowell, Massachusetts
NPDES Permit No. MA0100633
NPDES Permit Requirement: Part I.D.3

2013 Annual Infiltration/Inflow Report

The Lowell Regional Wastewater Utility (LRWWU) submitted an Infiltration/Inflow (I/I) Control Plan in May 2006 that documented I/I mitigation activities to-date and described a plan to continue mitigation work over the NPDES permit period. In accordance with NPDES Permit Requirement Part I.D.3, this document provides a summary of the I/I control actions implemented in 2013 and provides a projection of the activities that are planned for 2014.

In 2003, LRWWU obtained authorization for a $50 million sewer separation program. This program, which is Phase I of LRWWU's Long-Term Control Plan (LTCP) for CSO reduction, has funded the installation of fifteen (15) miles of new drain pipes in the City of Lowell. Six (6) new stormwater outfalls have been installed along streams that now carry millions of gallons of stormwater that previously flowed into Lowell's combined sewer system.

In 2007, LRWWU obtained approval for a bond authorization for a $5.5 million, 5-year sewer replacement/rehabilitation program. The $1.1 million annual program funding was used to pay for in-house television inspections, identification of sewer rehabilitation/replacement needs, and completion of the improvements. Existing sewers have been evaluated and rehabilitated with replacement sewers or cast-in-place pipe (CIPP) lining. These improvements have reduced infiltration into the existing sewer system by addressing the most serious rehabilitation needs that are identified. To date, more than eight (8) miles of sewer rehabilitation has been implemented through this program

In 2010, Phase I of LRWWU's LTCP was completed, investing nearly $10 Million on sewer separation, inspection, and rehabilitation. Approximately 750 acres have been separated and about 300 private inflow sources have been disconnected from LRWWU's sewer system. This removal of unnecessary inflow has significantly reduced Lowell's Combined Sewer Overflows (CSOs). Implementation of remote gate control at all of LRWWU's CSO diversion control gates has greatly helped LRWWU maximize interceptor storage and also reduced unnecessary CSO's.

During the year 2012, a flow assessment program was implemented. This consisted of flow monitoring meters set up at 24 different locations and groundwater meters at 3 different locations all throughout the city of Lowell. This flow assessment was used to monitor wet weather flows and will help target the areas of Lowell where excess I/I is present. This information is currently being studied in depth and LRWWU will be able to prioritize areas for future sewer separation and CIPP lining to minimize both I/I and CSOs (see LTCP Phase 2 for details.)

In the near future, LRWWU plans on making improvements to the collection system. LRWWU received funding authorization for another $40 Million in capital improvements, and will be using $33 Million for these improvements. These collection system improvements will include rehabilitation to existing sewers, sewer separation, and new wet-weather storage and treatment.

Since 2006, LRWWU's Non-Rain Related I/I has decreased by 76%. This is due to sewer separation projects, sewer rehabilitation, and the installation of a new plant effluent flow meter. There have been discrepancies with LRWWU's Duck Island effluent flow totals and since the upgrade of the effluent meter, LRWWU has been accurately calculating the effluent flows.

2013 Infiltration/Inflow Rates

Lowell operates a combined sewer system; therefore, the amount of inflow collected by the system is significant. The table below summarizes the estimated rain-related inflow and non-rain related I/I conveyed by the combined sewer system in Lowell in 2013.

The table summarizes the impact of infiltration and inflow (I/I) on flow rates at the Duck Island WWTF, in Million Gallons per Day (MGD). The number of days with precipitation (*Wet Days*) and the number of days without precipitation (*Dry Days*) are given for each month. Also shown are the average daily flow rates through the WWTF for *All / Wet / Dry Days*, for each month.

The *Average Rain-Related Inflow* rate (5.65 MGD) was calculated by subtracting the *WWTF Average Daily Flow (Dry Days)* from the *WWTF Average Daily Flow (Wet Days)*. The *Average Non-Rain Related Inflow / Infiltration (I/I)* was calculated by subtracting the municipal water production rate (9.3824 MGD) and the average town sewer flow contribution of 7.05 MGD from the *Average Daily Flow (Dry Days)*. The *Average Non-Rain Related I/I rate* for calendar year 2013 was 4.35 MGD. The month with the highest *Average Daily Non-Rain Related I/I* was March 2013 (14.82 MGD).

Due to high temperatures in the month of March 2013, there was a great amount of snow melt causing high WWTF influent flows. During this month, LRWWU's average daily flow on dry days was greater in value than the average daily flow on wet days. Therefore resulting in no rain related inflow and a relatively high non-rain related I/I.

2013 LRWWU Infiltration / Inflow Rates

Month	Wet Days / Dry Days	Flow (MGD)				
		WWTF Ave Daily Flow (All Days)	WWTF Ave Daily Flow (Wet Days)	WWTF Ave Daily Flow (Dry Days)	Ave Rain Related Inflow	Average Non-Rain Related I/I
January	8/23	22.52	24.76	21.74	3.02	5.27
February	10/18	24.05	28.79	21.42	7.37	4.98
March	**11/20**	**33.21**	**33.14**	**33.25**	**0.00**	**14.82**
April	9/21	26.76	30.13	25.32	4.82	7.76
May	13/18	22.70	25.95	20.35	5.59	4.29
June	15/15	32.57	38.51	26.63	11.89	8.55
July	8/23	26.22	32.81	23.93	8.89	8.04
August	7/24	21.11	26.42	19.56	6.86	3.57
September	6/24	19.06	24.86	17.61	7.25	2.18
October	6/25	16.44	19.03	15.82	3.22	0.35
November	9/21	17.49	21.01	15.98	5.03	0.16
December	11/20	20.64	23.23	19.22	4.01	3.72
Total / Average	113/252	23.56	27.39	21.73	5.65	4.35

2013 I/I Control Actions

In April 2006, LRWWU established an I/I Control Plan. Since then, numerous major sewer separation projects, sewer rehabilitation, and many hours of pipe assessment have been completed. Summarized below is the progress made by LRWWU for I/I control in 2013. LRWWU invested about $730,000 in I/I control actions related to an in-house sewer inspection program, and a sewer replacement program.

Sewer Separation Projects

LRWWU did not implement any new sewer separation projects in 2013.

Other Assessment and Rehabilitation Projects

LRWWU purchased a sewer inspection truck in 2007, along with two cameras and supporting hardware and software. This $185,000 investment has returned exceptional value.

In 2013, LRWWU completed in-house video inspection of approximately 79,195 LF of existing sewers and drain pipes. The sewer lines inspected were located in combined sewer systems, and separated areas. This inspection data is essential to support the I/I control initiatives described in this report.

Sewer Replacement Program

LRWWU continued to monitor and televise sewer/drain lines and determined which are in need of being replaced. During 2013, LRWWU completed 2,799 LF of sewer/drain line replacement. In addition, sewer rehabilitation work was performed throughout the collection system, including repair/replacement of 221 manholes and catch basins. Below is a summary of sewer replacement projects completed in 2013 that were 10 LF or greater. There were also many smaller sewer/drain replacement projects.

Avon St 126- 10 LF of 8” sewer
Arch St at Howard- 10 LF of 12” sewer
Austin St at Ftr Morrisette Blvd- 14 LF of 8” sewer
Belvidere Cir 55- 12 LF of 6” sewer
Chamberlain St 72- 27 LF of 8” sewer
Colonial Park Dr 1- 14 LF of 8” and 6” sewer
Daily School- 15 LF of 12” sewer
Dingwell- 290 LF of 8” sewer
Donald Terrace- 244 LF of 8” sewer
Douglas Terrace- 360 LF of 8” sewer
DPW yard- 11 LF of 6” sewer
E Merrimack St 390- 19 LF of 12” sewer
E Merrimack St 390- 10 LF of 8” sewer
Fairfield St 130- 15 LF of 6” sewer
Florida St 30- 11 LF of 6” sewer

Fulton St 71- 13 LF of 6" sewer
Fowler Rd 63- 10 LF of 8" sewer
Groton St at Rogers- 20 LF of 8" sewer
Hovey St 280- 15 LF of 10" and 6" sewer
Hovey St 244- 15 LF of 10" and 6" sewer
Hollis St at Bernier Rd- 15 LF of 10" sewer
Hovey St 31- 11 LF of 8" sewer
Hovey St 33- 38 LF of 8" sewer
Hovey St 61- 20 LF of 8" sewer
Industrial Ave (Trans gas)- 15 LF of 6" sewer
John St- 90 LF of 10" sewer
Kearney Drive- 228 LF of 8" sewer
Lakeview Av at Bunkerhill Av- 14 LF of 8" sewer
Market St 606- 20 LF of 12" sewer
Mammoth Road 235-237- 11 LF of 12" sewer
Mammoth Road at Columbia- 12 LF of 15" sewer
Mammoth Road 325- 12 LF of 12" sewer
Morningside Dr- 16 LF of 8" sewer
Nob Way 61- 12 LF of 8" sewer
Pleasant St 18- 10 LF of 12" sewer
River Rd at Burnham- 20 LF of 6" sewer
River Rd at Thornton- 23 LF of 6" sewer
River Rd at Virginia- 19 LF of 6" sewer
Stedman St 90- 20 LF of 8", 10", and 12" sewer
Sycamore St 40- 65 LF of 8" sewer
Westview Rd 41- 16 LF of 8" and 6" sewer
Westview Rd 62- 15 LF of 8" sewer
Wigthman Street- 252 LF of 8" sewer
Wigthman Street- 14 LF of 6" sewer

Sewer Rehabilitation Program

A 3 year, $1.4 million CIPP lining contract was implemented in 2013. Based on televised inspection, LRWWU has determined areas of known sewer deficiencies and infiltration. The contractor has been lining these target areas which will diminish any I/I present.

In 2013, LRWWU continued to inspect cross-country sewer lines. A total of 79,195 LF of sewer/drain lines were inspected. During inspection, video data was recorded and reviewed for excessive I/I. As a result, 3,692 LF of CIPP lining was installed in 2013. LRWWU will continue to monitor these lines and implement future CIPP lining throughout the system where the most severe I/I is located.

Projected 2014 I/I Control Actions

In 2014, LRWWU plans on purchasing a new sewer inspection truck with new cameras and more up to date equipment. This equipment will allow for a better quality video and will make it easier to spot deficiencies in the pipes. LRWWU also plans on updating the truck's GIS functionality. It will also allow an easier access to these videos and better GIS editing options for onsite editing.

The flow assessment, executed in 2012, will be analyzed in depth to prioritize the areas in Lowell for future sewer separation and CIPP lining to minimize I/I. Using this information, LRWWU will also be able to determine if I/I exists from the water bodies the siphons cross through and from high water body levels.

LRWWU will continue to rehabilitate cross-country sewers and other miscellaneous sewers that display excessive I/I or structural deficiencies. Below is a summary of LRWWU's I/I control actions planned for 2014.

Sewer Separation Projects

In 2014, LRWWU is planning to implement a sewer separation project in the Tilden Basin in collaboration with UMass Lowell. LRWWU will continue to assess I/I and evaluate areas in most need of sewer separation. Miscellaneous sewer separation projects outside of targeted areas will also be implemented wherever practical.

Other Assessment and Rehabilitation Projects

Sewer Replacement Program

LRWWU will continue to replace and rehabilitate existing sewers throughout the city. In-house video inspection of existing sewers will identify candidate pipes for the Sewer Replacement Program. A contract is in place to implement this program.

Sewer Rehabilitation Program

LRWWU will continue to televise existing cross-country pipe routes in 2014. LRWWU will review video of the inspected cross-country pipes and implement a plan for the rehabilitation of high-priority lines. Cast-in-place lining is the preferred rehabilitation method for these sewer lines.

Using the 3 year, $1.4 million CIPP lining contract that was implemented in 2013 and determined areas of known sewer deficiencies and infiltration, the contractor will continue to line these target areas which will diminish any I/I present.

LOWELL REGIONAL WASTEWATER UTILITY

WASTEWATER COLLECTION AND TREATMENT

MARK A. YOUNG
EXECUTIVE DIRECTOR

SERVING
LOWELL
CHELMSFORD
DRACUT
TEWKSBURY
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April 1, 2014

Water Technical Unit
U.S. Environmental Protection Agency
PO Box 8127 (SEW)
Boston MA 02114

Massachusetts Department of Environmental Protection
Northeast Regional Office
Bureau of Resource Protection
One Winter Street
Boston MA 02108

Subject: Annual Certification Statement of CSO Discharges for NPDES Permit No. MA0100633

To Whom It May Concern,

On behalf of the Lowell Regional Wastewater Utility (LRWWU), I hereby certify that all CSO discharges from LRWWU's permitted outfalls have been recorded for the 2013 reporting period. CSO discharge records are kept on file.

These records include dates and times of CSO events, CSO volumes and durations, precipitation amounts, and WWTF wet weather flows.

Respectfully,

Carrie Prescott
Staff Engineer
LRWWU

Copy / File
Mark Young, Executive Director
Mike Stuer, Engineering Manager
Aaron Fox, Maintenance Superintendent
Tom Kawa, Operations Superintendent

LOWELL REGIONAL WASTEWATER UTILITY

WASTEWATER COLLECTION AND TREATMENT

MARK A. YOUNG
EXECUTIVE DIRECTOR

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April 1, 2014

Water Technical Unit
U.S. Environmental Protection Agency
PO Box 8127 (SEW)
Boston MA 02114

Massachusetts Department of Environmental Protection
Northeast Regional Office
Bureau of Resource Protection
One Winter Street
Boston MA 02108

Subject: Annual Certification Statement of CSO Structure Inspections for NPDES Permit No. MA0100633

To Whom It May Concern,

On behalf of the Lowell Regional Wastewater Utility (LRWWU), I hereby certify that all CSO structures have been routinely inspected during the 2013 reporting period. Inspection records are kept on file.

These inspections include the date, the time, the inspectors, the general conditions of the facility, and notes on the operating condition of the facility.

Respectfully,

Aaron Fox
Maintenance Superintendent
LRWWU

Copy / File
Mark Young, Executive Director
Mike Stuer, Engineering Manager
Tom Kawa, Operations Superintendent

Lowell Regional Wastewater Utility
Wet Weather Operational Data
January 01, 2013 - March 31, 2013

Date	Plant Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
01/01/13	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
03/31/13	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
1/1/2013	23.88	30.55		1	0.13	0.06																															
1/11/2013	23.09	31.12		1	0.13	0.06																															
1/12/2013	24.92	32.32		1	0.02	0.01																															
1/16/2013	25.26	34.81		1	0.13	0.03																															
1/17/2013	24.75	32.21		1	0.37	0.11																															
1/29/2013	20.38	24.98		1	0.17	0.06																															
1/30/2013	23.11	28.98		1	0.09	0.02																															
1/31/2013	32.71	59.44	59.44	1	0.35	0.14	0.14	1	6.33	4.16													1	0.57	0.09				1	1.67	1.12				1	2.23	1.21
2/6/2013	19.87	24.99		1	0.02	0.02																															
2/10/2013	18.79	25.42		1	0.06	0.04																															
2/11/2013	21.14	29.31		1	0.23	0.10																															
2/16/2013	21.22	28.26		1	0.02	0.02																															
2/19/2013	22.46	38.24		1	0.20	0.06																															
2/23/2013	22.45	29.25		1	0.06	0.02																															
2/24/2013	33.96	52.92	52.92	1	0.44	0.06	0.06	1	7.72	3.77																											
2/25/2013	25.12	29.51		1	0.07	0.04																															
2/27/2013	63.95	98.85	98.85	1	0.94	0.10	0.10	1	17.17	28.75	1	7.30	0.23				1	1.03	0.71				1	0.55	0.14							1	6.62	5.88	1	15.50	6.96
2/28/2013	38.95	65.42	65.42	1	0.01	0.01	0.01	1	7.10	4.70	1	0.92	0.01																			1	0.48	0.26	1	1.40	0.27
3/1/2013	34.59	41.42	41.42			0.00	0.00	1	0.03	0.01																											
3/6/2013	31.68	36.55		1	0.17	0.02																															
3/7/2013	32.75	35.37		1	0.08	0.03																															
3/8/2013	32.62	36.46		1	0.35	0.09																															
3/9/2013	31.41	40.69		1	0.10	0.06																															
3/12/2013	46.35	88.57	88.57	1	0.33	0.17	0.17	1	4.70	8.37	1	0.68	0.17				1	1.10	1.57				1	0.70	0.13				1	0.58	0.02	1	0.60	0.41	1	3.67	2.30
3/13/2013	45.02	74.05	74.05			0.00	0.00	1	6.18	4.86							1	0.22	0.01																1	0.22	0.01
3/19/2013	34.00	42.54		1	0.31	0.06																															
3/20/2013	36.65	40.16		1	0.44	0.14																															
3/21/2013	31.34	38.05		1	0.07	0.03																															
3/28/2013	29.74	32.50		1	0.02	0.01																															
3/29/2013	28.55	32.14		1	0.02	0.01																															
3/31/2013	29.43	33.38		1	0.02	0.00																															

Date	Primary Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
No. Days	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
90	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
Total	-	-	-	**29**	**5.35**	-	-	**7**	**49.23**	**54.62**	**3**	**8.90**	**0.41**	-	-	-	**3**	**2.35**	**2.29**	-	-	-	**3**	**1.82**	**0.36**	-	-	-	**2**	**2.25**	**1.14**	**3**	**7.70**	**6.55**	**5**	**23.02**	**10.75**
Avg/Percent	**29.73**	**40.44**	**68.67**	**32.2**	**0.18**	**0.05**	**0.07**	**24.1**	**7.03**	**7.80**	**10.3**	**2.97**	**0.14**	-	-	-	**10.3**	**0.78**	**0.76**	-	-	-	**10.3**	**0.61**	**0.12**	-	-	-	**6.9**	**1.13**	**0.57**	**10.3**	**2.57**	**2.18**	**17.2**	**4.60**	**2.15**

Lowell Regional Wastewater Utility
Wet Weather Operational Data
April 01, 2013 - June 30, 2013

Date	Plant Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
04/01/13	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
06/30/13	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
4/1/2013	35.07	47.53		1	0.15	0.05																															
4/9/2013	25.84	30.63		1	0.09	0.09																															
4/10/2013	31.39	72.91	72.91	1	0.35	0.17	0.17	1	2.88	2.84																											
4/11/2013	29.79	41.29	41.29	1	0.09	0.04	0.04	1	0.32	0.08																											
4/12/2013	37.47	71.10	71.10	1	0.38	0.11	0.11	1	4.18	2.57																											
4/13/2013	30.50	39.19	39.19	1	0.08	0.05	0.05																						1	0.47	0.01				1	0.47	0.01
4/20/2013	31.89	42.42		1	0.32	0.11																															
4/23/2013	25.67	30.83		1	0.03	0.01																															
4/25/2013	23.56	27.80		1	0.02	0.02																															
5/8/2013	18.93	23.44		1	0.02	0.02																															
5/9/2013	30.75	64.33	64.33	1	0.28	0.12	0.12	1	5.52	6.05													1	0.55	0.23				1	1.07	1.11				1	1.62	1.34
5/10/2013	21.66	25.96		1	0.28	0.01																															
5/11/2013	25.33	60.57	60.57	1	0.17	0.13	0.13	1	3.05	2.44																											
5/12/2013	22.79	30.70		1	0.09	0.04																															
5/19/2013	19.05	24.86		1	0.12	0.06																															
5/20/2013	20.88	31.18		1	0.06	0.04																															
5/22/2013	35.34	70.51	70.51	1	0.54	0.13	0.13	1	7.05	9.18													1	0.27	0.04				1	0.45	0.18				1	0.72	0.22
5/23/2013	21.35	28.40		1	0.18	0.12																															
5/24/2013	37.41	70.04	70.04	1	0.41	0.09	0.09	1	7.35	6.69													1	0.07	0.01										1	0.07	0.01
5/25/2013	30.98	45.40	45.40	1	0.29	0.10	0.10	1	1.98	0.60																											
5/26/2013	24.06	29.70		1	0.08	0.04																															
5/29/2013	28.80	59.35	59.35	1	0.33	0.11	0.11	1	4.70	3.28																											
5/30/2013	24.38	47.30	47.30			0.00	0.00	1	2.30	1.23																											
6/2/2013	21.63	29.94		1	0.04	0.03																															
6/3/2013	30.84	65.00	65.00	1	0.32	0.13	0.13	1	5.80	3.74																											
6/7/2013	46.90	94.58	94.58	1	1.43	0.31	0.31	1	10.35	16.19	1	2.58	0.95	1	0.22	0.05	1	4.27	3.91				1	3.17	1.19				1	1.88	1.14	1	1.68	1.47	1	13.80	8.71
6/8/2013	51.95	93.91	93.91	1	0.78	0.28	0.28	1	11.88	13.19	1	6.25	1.84	1	0.73	0.38	1	4.17	4.75				1	3.08	2.24	1	0.05	0.08	1	1.52	2.06	1	2.73	2.82	1	18.53	14.17
6/10/2013	28.94	75.12	75.12	1	0.35	0.16	0.16	1	1.48	1.42													1	0.43	0.06				1	0.43	0.05				1	0.87	0.11
6/11/2013	65.70	90.31	90.31	1	0.98	0.35	0.35	1	17.73	28.20	1	0.58	0.26	1	0.52	0.30	1	1.32	1.74				1	2.07	1.23	1	0.08	0.08	1	0.98	2.16	1	0.63	1.06	1	6.18	6.83
6/12/2013	35.03	63.29	63.29	1	0.02	0.01	0.01	1	1.60	1.23																											
6/13/2013	41.89	58.99	58.99	1	0.38	0.09	0.09	1	6.48	5.21																											
6/14/2013	57.31	72.20	72.20	1	0.69	0.12	0.12	1	19.87	18.01	1	3.83	0.71				1	3.92	3.88				1	2.25	0.24							1	3.63	1.81	1	13.63	6.64
6/17/2013	39.90	79.51	79.51	1	0.31	0.24	0.24	1	6.33	6.30	1	0.60	0.31	1	0.03	0.01	1	1.75	1.82				1	0.83	0.37				1	1.00	1.64				1	4.22	4.15
6/18/2013	40.26	73.11	73.11	1	0.27	0.21	0.21	1	5.23	4.60													1	0.27	0.02										1	0.27	0.02
6/19/2013	32.33	35.95		1	0.05	0.05																															
6/26/2013	28.27	54.75	54.75	1	0.04	0.02	0.02	1	5.07	3.48																			1	0.38	0.19				1	0.38	0.19
6/27/2013	24.87	42.43	42.43	1	0.09	0.04	0.04	1	1.62	0.69																											
6/28/2013	31.88	53.06	53.06	1	0.17	0.13	0.13	1	3.25	1.23													1	0.42	0.07										1	0.42	0.07

Date	Primary Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
No. Days	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
91	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
Total	-	-	-	37	10.28	-	-	23	136.03	138.45	5	13.85	4.07	4	1.50	0.74	5	15.42	16.10	-	-	-	11	13.40	5.70	2	0.13	0.16	9	8.18	8.54	4	8.68	7.16	13	61.17	42.47
Avg/Percent	31.86	52.57	64.93	40.7	0.28	0.10	0.13	62.2	5.91	6.02	13.5	2.77	0.81	10.8	0.38	0.19	13.5	3.08	3.22	-	-	-	29.7	1.22	0.52	5.4	0.07	0.08	24.3	0.91	0.95	10.8	2.17	1.79	35.1	4.71	3.27

Lowell Regional Wastewater Utility
Wet Weather Operational Data
July 01, 2013 - September 30, 2013

Date	Plant Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
07/01/13	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
09/30/13	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
7/1/2013	32.73	86.93	86.93	1	1.58	0.94	0.94	1	9.55	17.85	1	4.80	2.71	1	1.67	4.38	1	4.08	4.55				1	2.45	2.95	1	1.47	5.96	1	2.48	11.54	1	3.58	14.30	1	20.53	46.39
7/2/2013	34.39	47.51	47.51			0.00	0.00	1	2.55	0.97																											
7/8/2013	30.79	65.81	65.81	1	0.39	0.39	0.39	1	5.18	7.66				1	0.43	0.04	1	0.43	0.52				1	0.62	0.54				1	0.47	0.69	1	0.52	1.03	1	2.47	2.82
7/9/2013	24.95	40.08	40.08			0.00	0.00	1	1.03	0.56																											
7/10/2013	24.91	32.98		1	0.05	0.04																															
7/11/2013	24.71	30.61		1	0.04	0.04																															
7/23/2013	46.86	87.14	87.14	1	1.86	0.85	0.85	1	13.45	21.39	1	2.25	1.80	1	0.93	0.78	1	4.80	9.75				1	3.90	4.36	1	0.43	0.30	1	3.25	8.00	1	4.32	8.12	1	19.88	33.11
7/25/2013	37.18	96.03	96.03	1	1.28	0.51	0.51	1	5.15	9.48	1	1.82	1.69	1	0.22	0.04	1	2.20	2.82				1	2.32	1.42				1	2.60	2.54	1	2.25	2.23	1	11.40	10.74
7/26/2013	32.16	63.40	63.40	1	0.15	0.02	0.02	1	2.80	2.28																											
7/29/2013	33.16	83.32	83.32	1	0.28	0.19	0.19	1	5.22	3.22													1	0.77	0.64				1	0.70	1.54				1	1.47	2.18
8/1/2013	21.60	25.36		1	0.04	0.02																															
8/2/2013	35.78	82.30	82.30	1	0.77	0.40	0.40	1	4.67	4.35	1	0.68	0.58				1	1.67	2.78				1	1.50	0.65				1	1.52	1.88				1	5.37	5.89
8/4/2013	23.18	33.12		1	0.11	0.11																															
8/9/2013	39.36	87.17	87.17	1	0.80	0.30	0.30	1	10.08	12.21	1	0.47	0.17	1	0.20	0.05	1	0.80	1.36				1	1.25	0.55				1	0.95	0.73	1	0.42	0.28	1	4.08	3.14
8/13/2013	21.07	26.07		1	0.03	0.01																															
8/29/2013	18.15	23.70		1	0.02	0.02																															
8/31/2013	25.81	58.05	58.05	1	0.32	0.19	0.19	1	3.13	2.18													1	0.52	0.14				1	0.85	0.47				1	1.37	0.61
9/2/2013	21.76	31.02		1	0.10	0.04																															
9/5/2013	20.19	28.68		1	0.06	0.03																															
9/10/2013	18.20	29.27		1	0.10	0.06																															
9/12/2013	22.52	82.35	82.35	1	1.06	0.72	0.72	1	1.95	3.47	1	1.42	1.61	1	1.57	1.35	1	1.57	5.67				1	1.68	2.60	1	1.05	0.81	1	1.88	7.14	1	1.70	2.95	1	10.87	22.13
9/13/2013	38.33	68.97	68.97	1	0.65	0.30	0.30	1	9.68	10.53	1	1.10	0.31	1	0.05	0.02	1	1.58	2.12				1	0.55	0.07				1	0.55	0.29	1	1.28	0.66	1	5.12	3.47
9/22/2013	28.17	80.85	80.85	1	0.43	0.32	0.32	1	5.00	8.05				1	0.63	0.23							1	0.93	0.46				1	0.83	0.78				1	2.40	1.47
Date	**Primary Effluent**			**Precipitation**				**Secondary Bypass**			**Barasford Street**			**Beaver Brook**			**Merrimack Street**			**Read Street**			**Tilden Street**			**Walker Street**			**Warren Street**			**West Street**			**All Diversions**		
No. Days	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
92	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
Total	**-**	**-**	**-**	**21**	**10.12**	**-**	**-**	**14**	**79.45**	**104.20**	**7**	**12.53**	**8.87**	**8**	**5.70**	**6.89**	**8**	**17.13**	**29.57**	**-**	**-**	**-**	**11**	**16.48**	**14.38**	**3**	**2.95**	**7.07**	**11**	**16.08**	**35.60**	**7**	**14.07**	**29.57**	**11**	**84.95**	**131.95**
Avg/Percent	**28.52**	**56.12**	**73.57**	**22.8**	**0.48**	**0.24**	**0.37**	**66.7**	**5.68**	**7.44**	**33.3**	**1.79**	**1.27**	**38.1**	**0.71**	**0.86**	**38.1**	**2.14**	**3.70**	**-**	**-**	**-**	**52.4**	**1.50**	**1.31**	**14.3**	**0.98**	**2.36**	**52.4**	**1.46**	**3.24**	**33.3**	**2.01**	**4.22**	**52.4**	**7.72**	**12.00**

Lowell Regional Wastewater Utility
Wet Weather Operational Data
October 01, 2013 - December 31, 2013

Date	Plant Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
10/01/13	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
12/31/13	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
10/4/2013	21.69	50.38	50.38	1	0.23	0.14	0.14	1	4.03	2.26																											
10/6/2013	22.43	34.49	34.49	1	0.25	0.06	0.06	1	0.03	0.01																											
10/7/2013	18.72	31.14	31.14	1	0.11	0.07	0.07	1	0.68	0.11																											
10/18/2013	16.38	24.20		1	0.06	0.03																															
10/30/2013	16.85	21.12		1	0.03	0.01																															
10/31/2013	18.13	23.20		1	0.14	0.06																															
11/7/2013	16.53	24.27		1	0.09	0.02																															
11/8/2013	15.58	19.56		1	0.02	0.01																															
11/10/2013	16.34	23.20		1	0.04	0.02																															
11/12/2013	16.69	20.57		1	0.06	0.04																															
11/17/2013	16.32	22.63		1	0.02	0.01																															
11/18/2013	20.26	31.07	31.07	1	0.18	0.12	0.12																						1	1.07	0.34				1	1.07	0.34
11/22/2013	19.09	32.63		1	0.17	0.05																															
11/26/2013	16.04	21.07		1	0.13	0.04																															
11/27/2013	52.23	85.10	85.10	1	1.33	0.15	0.15	1	15.68	15.09	1	2.15	0.27				1	4.10	3.94				1	0.13	0.01				1	0.52	0.22				1	6.90	4.44
12/1/2013	20.28	31.01		1	0.19	0.04																															
12/6/2013	19.34	37.27		1	0.22	0.05																															
12/7/2013	22.83	35.76		1	0.12	0.02																															
12/9/2013	22.91	32.87		1	0.35	0.07																															
12/10/2013	19.07	23.46		1	0.02	0.01																															
12/19/2013	17.40	21.15		1	0.24	0.08																															
12/20/2013	18.62	22.92		1	0.46	0.13																															
12/22/2013	21.38	27.38		1	0.02	0.01																															
12/23/2013	32.65	57.96	57.96	1	0.46	0.09	0.09	1	5.00	1.68																											
12/27/2013	20.32	25.88		1	0.09	0.03																															
12/29/2013	40.69	96.90	96.90	1	0.95	0.24	0.24	1	7.43	12.81				1	0.43	0.14	1	2.65	4.54				1	2.15	0.84				1	2.65	2.51	1	1.87	1.82	1	9.75	9.85
12/30/2013	31.18	71.59	71.59			0.00	0.00	1	2.23	2.25																											

Date	Primary Effluent			Precipitation				Secondary Bypass			Barasford Street			Beaver Brook			Merrimack Street			Read Street			Tilden Street			Walker Street			Warren Street			West Street			All Diversions		
No. Days	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak Hour	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume	Event	Duration	Volume
92	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)	(No.)	(Hours)	(MG)
Total	-	-	-	26	5.98	-	-	7	35.10	34.21	1	2.15	0.27	1	0.43	0.14	2	6.75	8.48	-	-	-	2	2.28	0.85	-	-	-	3	4.23	3.07	1	1.87	1.82	3	17.72	14.63
Avg/Percent	21.85	35.14	57.33	28.3	0.23	0.06	0.11	26.9	5.01	4.89	3.8	2.15	0.27	3.8	0.43	0.14	7.7	3.38	4.24	-	-	-	7.7	1.14	0.43	-	-	-	11.5	1.41	1.02	3.8	1.87	1.82	11.5	5.91	4.88

Lowell Regional Wastewater Utility
Wet Weather Operational Data
January 01, 2013 - December 31, 2013

Date	Plant Effluent			Precipitation				Secondary Bypass				Barasford Street				Beaver Brook				Merrimack Street				Read Street				Tilden Street				Walker Street				Warren Street				West Street				All Diversions			
01/01/13	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak hour	Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume	
12/31/13	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)	
1/1/2013	23.88	30.55		1	0.13	0.06																																							
1/11/2013	23.09	31.12		1	0.13	0.06																																						
1/12/2013	24.92	32.32		1	0.02	0.01																																						
1/16/2013	25.26	34.81		1	0.13	0.03																																						
1/17/2013	24.75	32.21		1	0.37	0.11																																						
1/29/2013	20.38	24.98		1	0.17	0.06																																						
1/30/2013	23.11	28.98		1	0.09	0.02																																						
1/31/2013	32.71	59.44	59.44	1	0.35	0.14	0.14	1	6.33	4.16																		1	0.57	0.09						1	1.67	1.12						1	2.23	1.21	
2/6/2013	19.87	24.99		1	0.02	0.02																																						
2/10/2013	18.79	25.42		1	0.06	0.04																																						
2/11/2013	21.14	29.31		1	0.23	0.10																																						
2/16/2013	21.22	28.26		1	0.02	0.02																																						
2/19/2013	22.46	38.24		1	0.20	0.06																																						
2/23/2013	22.45	29.25		1	0.06	0.02																																						
2/24/2013	33.96	52.92	52.92	1	0.44	0.06	0.06	1	7.72	3.77																																				
2/25/2013	25.12	29.51		1	0.07	0.04																																						
2/27/2013	63.95	98.85	98.85	1	0.94	0.10	0.10	1	17.17	28.75		1	7.30	0.23						1	1.03	0.71						1	0.55	0.14										1	6.62	5.88		1	15.50	6.96	
2/28/2013	38.95	65.42	65.42	1	0.01	0.01	0.01	1	7.10	4.70		1	0.92	0.01																										1	0.48	0.26		1	1.40	0.27	
3/1/2013	34.59	41.42	41.42			0.00	0.00	1	0.03	0.01																																				
3/6/2013	31.68	36.55		1	0.17	0.02																																						
3/7/2013	32.75	35.37		1	0.08	0.03																																						
3/8/2013	32.62	36.46		1	0.35	0.09																																						
3/9/2013	31.41	40.69		1	0.10	0.06																																						
3/12/2013	46.35	88.57	88.57	1	0.33	0.17	0.17	1	4.70	8.37		1	0.68	0.17						1	1.10	1.57						1	0.70	0.13						1	0.58	0.02		1	0.60	0.41		1	3.67	2.30	
3/13/2013	45.02	74.05	74.05			0.00	0.00	1	6.18	4.86										1	0.22	0.01																						1	0.22	0.01	
3/19/2013	34.00	42.54		1	0.31	0.06																																						
3/20/2013	36.65	40.16		1	0.44	0.14																																						
3/21/2013	31.34	38.05		1	0.07	0.03																																						
3/28/2013	29.74	32.50		1	0.02	0.01																																						
3/29/2013	28.55	32.14		1	0.02	0.01																																						
3/31/2013	29.43	33.38		1	0.02	0.00																																						
4/1/2013	35.07	47.53		1	0.15	0.05																																						
4/9/2013	25.84	30.63		1	0.09	0.09																																						
4/10/2013	31.39	72.91	72.91	1	0.35	0.17	0.17	1	2.88	2.84																																				
4/11/2013	29.79	41.29	41.29	1	0.09	0.04	0.04	1	0.32	0.08																																				
4/12/2013	37.47	71.10	71.10	1	0.38	0.11	0.11	1	4.18	2.57																																				
4/13/2013	30.50	39.19	39.19	1	0.08	0.05	0.05																													1	0.47	0.01						1	0.47	0.01	
4/20/2013	31.89	42.42		1	0.32	0.11																																						
4/23/2013	25.67	30.83		1	0.03	0.01																																						
4/25/2013	23.56	27.80		1	0.02	0.02																																						
5/8/2013	18.93	23.44		1	0.02	0.02																																						
5/9/2013	30.75	64.33	64.33	1	0.28	0.12	0.12	1	5.52	6.05																		1	0.55	0.23						1	1.07	1.11						1	1.62	1.34	
5/10/2013	21.66	25.96		1	0.28	0.01																																						
5/11/2013	25.33	60.57	60.57	1	0.17	0.13	0.13	1	3.05	2.44																																				
5/12/2013	22.79	30.70		1	0.09	0.04																																						
5/19/2013	19.05	24.86		1	0.12	0.06																																						
5/20/2013	20.88	31.18		1	0.06	0.04																																						
5/22/2013	35.34	70.51	70.51	1	0.54	0.13	0.13	1	7.05	9.18																		1	0.27	0.04						1	0.45	0.18						1	0.72	0.22	
5/23/2013	21.35	28.40		1	0.18	0.12																																						
5/24/2013	37.41	70.04	70.04	1	0.41	0.09	0.09	1	7.35	6.69																		1	0.07	0.01														1	0.07	0.01	
5/25/2013	30.98	45.40	45.40	1	0.29	0.10	0.10	1	1.98	0.60																																		
5/26/2013	24.06	29.70		1	0.08	0.04																																						
5/29/2013	28.80	59.35	59.35	1	0.33	0.11	0.11	1	4.70	3.28																																				
5/30/2013	24.38	47.30	47.30			0.00	0.00	1	2.30	1.23																																				
6/2/2013	21.63	29.94		1	0.04	0.03																																						
6/3/2013	30.84	65.00	65.00	1	0.32	0.13	0.13	1	5.80	3.74																																				
6/7/2013	46.90	94.58	94.58	1	1.43	0.31	0.31	1	10.35	16.19		1	2.58	0.95		1	0.22	0.05		1	4.27	3.91						1	3.17	1.19						1	1.88	1.14		1	1.68	1.47		1	13.80	8.71	
6/8/2013	51.95	93.91	93.91	1	0.78	0.28	0.28	1	11.88	13.19		1	6.25	1.84		1	0.73	0.38		1	4.17	4.75						1	3.08	2.24		1	0.05	0.08		1	1.52	2.06		1	2.73	2.82		1	18.53	14.17	
6/10/2013	28.94	75.12	75.12	1	0.35	0.16	0.16	1	1.48	1.42																		1	0.43	0.06						1	0.43	0.05						1	0.87	0.11	
6/11/2013	65.70	90.31	90.31	1	0.98	0.35	0.35	1	17.73	28.20		1	0.58	0.26		1	0.52	0.30		1	1.32	1.74						1	2.07	1.23		1	0.08	0.08		1	0.98	2.16		1	0.63	1.06		1	6.18	6.83	
6/12/2013	35.03	63.29	63.29	1	0.02	0.01	0.01	1	1.60	1.23																																		
6/13/2013	41.89	58.99	58.99	1	0.38	0.09	0.09	1	6.48	5.21																																		
6/14/2013	57.31	72.20	72.20	1	0.69	0.12	0.12	1	19.87	18.01		1	3.83	0.71						1	3.92	3.88						1	2.25	0.24										1	3.63	1.81		1	13.63	6.64	
6/17/2013	39.90	79.51	79.51	1	0.31	0.24	0.24	1	6.33	6.30		1	0.60	0.31		1	0.03	0.01		1	1.75	1.82						1	0.83	0.37						1	1.00	1.64						1	4.22	4.15	
6/18/2013	40.26	73.11	73.11	1	0.27	0.21	0.21	1	5.23	4.60																		1	0.27	0.02														1	0.27	0.02	
6/19/2013	32.33	35.95		1	0.05	0.05																																						
6/26/2013	28.27	54.75	54.75	1	0.04	0.02	0.02	1	5.07	3.48																																				
6/27/2013	24.87	42.43	42.43	1	0.09	0.04	0.04	1	1.62	0.69																																		
6/28/2013	31.88	53.06	53.06	1	0.17	0.13	0.13	1	3.25	1.23																		1	0.42	0.07														1	0.42	0.07	
7/1/2013	32.73	86.93	86.93	1	1.58	0.94	0.94	1	9.55	17.85		1	4.80	2.71		1	1.67	4.38		1	4.08	4.55						1	2.45	2.95		1	1.47	5.96		1	2.48	11.54		1	3.58	14.30		1	20.53	46.39	
7/2/2013	34.39	47.51	47.51			0.00	0.00	1	2.55	0.97																																		
7/8/2013	30.79	65.81	65.81	1	0.39	0.39	0.39	1	5.18	7.66						1	0.43	0.04		1	0.43	0.52						1	0.62	0.54						1	0.47	0.69		1	0.52	1.03		1	2.47	2.82	
7/9/2013	24.95	40.08	40.08			0.00	0.00	1	1.03	0.56																																		
7/10/2013	24.91	32.98		1	0.05	0.04																																						
7/11/2013	24.71	30.61		1	0.04	0.04																																						
7/23/2013	46.86	87.14	87.14	1	1.86	0.85	0.85	1	13.45	21.39		1	2.25	1.80		1	0.93	0.78		1	4.80	9.75						1	3.90	4.36		1	0.43	0.30		1	3.25	8.00		1	4.32	8.12		1	19.88	33.11	
7/25/2013	37.18	96.03	96.03	1	1.28	0.51	0.51	1	5.15	9.48		1	1.82	1.69		1	0.22	0.04		1	2.20	2.82						1	2.32	1.42						1	2.60	2.54		1	2.25	2.23		1	11.40	10.74	
7/26/2013	32.16	63.40	63.40	1	0.15	0.02	0.02	1	2.80	2.28																																		
7/29/2013	33.16	83.32	83.32	1	0.28	0.19	0.19	1	5.22	3.22																		1	0.77	0.64						1	0.70	1.54						1	1.47	2.18	
8/1/2013	21.60	25.36		1	0.04	0.02																																						
8/2/2013	35.74	82.30	82.30	1	0.77	0.40	0.40	1	4.67	4.35		1	0.68	0.58						1	1.67	2.78						1	1.50	0.65						1	1.52	1.88						1	5.37	5.89	
8/4/2013	23.18	33.12		1	0.11	0.11																																						
8/9/2013	39.36	87.17	87.17	1	0.80	0.30	0.30	1	10.08	12.21		1	0.47	0.17		1	0.20	0.05		1	0.80	1.36						1	1.25	0.55						1	0.95	0.73		1	0.42	0.28		1	4.08	3.14	
8/13/2013	21.07	26.07		1	0.03	0.01																																						
8/29/2013	18.15	23.70		1	0.02	0.02																																						
8/31/2013	25.81	58.05	58.05	1	0.32	0.19	0.19	1	3.13	2.18																		1	0.52	0.14						1	0.85	0.47						1	1.37	0.61	
9/2/2013	21.76	31.02		1	0.10	0.04																																						
9/5/2013	20.19	28.68		1	0.06	0.03																																						
9/10/2013	18.20	29.27		1	0.10	0.06																																						
9/12/2013	22.52	82.35	82.35	1	1.06	0.72	0.72	1	1.95	3.47		1	1.42	1.61		1	1.57	1.35		1	1.57	5.67						1	1.68	2.60		1	1.05	0.81		1	1.88	7.14		1	1.70	2.95		1	10.87	22.13	
9/13/2013	38.33	68.97	68.97	1	0.65	0.30	0.30	1	9.68	10.53		1	1.10	0.31		1	0.05	0.02		1	1.58	2.12						1	0.55	0.07						1	0.55	0.29		1	1.28	0.66		1	5.12	3.47	
9/22/2013	28.17	80.85	80.85	1	0.43	0.32	0.32	1	5.00	8.05						1	0.63	0.23										1	0.93	0.46						1	0.83	0.78						1	2.40	1.47	
10/4/2013	21.69	50.38	50.38	1	0.23	0.14	0.14	1	4.03	2.26																																		
10/6/2013	22.43	34.49	34.49	1	0.25	0.06	0.06	1	0.03	0.01																																		
10/7/2013	18.72	31.14	31.14	1	0.11	0.07	0.07	1	0.68	0.11																																		
10/18/2013	16.38	24.20		1	0.06	0.03																																						
10/30/2013	16.85	21.12		1	0.03	0.01																																						
10/31/2013	18.13	23.20		1	0.14	0.06																																						
11/7/2013	16.53	24.27		1	0.09	0.02																																						
11/8/2013	15.58	19.56		1	0.02	0.01																																						
11/10/2013	16.34	23.20		1	0.04	0.02																																						
11/12/2013	16.69	20.57		1	0.06	0.04																																						
11/17/2013	16.32	22.63		1	0.02	0.01																																						
11/18/2013	20.26	31.07	31.07	1	0.18	0.12	0.12																													1	1.07	0.34						1	1.07	0.34	
11/22/2013	19.09	32.63		1	0.17	0.05																																						
11/26/2013	16.04	21.07		1	0.13	0.04																																						
11/27/2013	52.23	85.10	85.10	1	1.33	0.15	0.15	1	15.68	15.09		1	2.15	0.27						1	4.10	3.94						1	0.13	0.01						1	0.52	0.22						1	6.90	4.44	
12/1/2013	20.28	31.01		1	0.19	0.04																																						
12/6/2013	19.34	37.27		1	0.22	0.05																																						
12/7/2013	22.83	35.76		1	0.12	0.02																																						
12/9/2013	22.91	32.87		1	0.35	0.07																																						
12/10/2013	19.07	23.46		1	0.02	0.01																																						
12/19/2013	17.40	21.15		1	0.24	0.08																																						
12/20/2013	18.62	22.92		1	0.46	0.13																																						
12/22/2013	21.38	27.38		1	0.02	0.01																																						
12/23/2013	32.65	57.96	57.96	1	0.46	0.09	0.09	1	5.00	1.68																																				
12/27/2013	20.32	25.88		1	0.09	0.03																																						
12/29/2013	40.69	96.90	96.90	1	0.95	0.24	0.24	1	7.43	12.81						1	0.43	0.14		1	2.65	4.54						1	2.15	0.84						1	2.65	2.51		1	1.87	1.82		1	9.75	9.85	
12/30/2013	31.18	71.59	71.59			0.00	0.00	1	2.23	2.25																																				

Date	Primary Effluent			Precipitation				Secondary Bypass				Barasford Street				Beaver Brook				Merrimack Street				Read Street				Tilden Street				Walker Street				Warren Street				West Street				All Diversions			
No. Days	Flow	Peak Hour	Event Peak	Precip Days	Daily Total	Peak Hour	Event Peak hour	Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume		Event	Duration	Volume	
365	(MG)	(MGD)	(MGD)	(No.)	(Inches)	(Inches)	(Inches)	(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)		(No.)	(Hours)	(MG)	
Total	-	-	-	113	31.73	-	-	51	299.82	331.48		16	37.43	13.62		13	7.63	7.77		18	41.65	56.44		-	-	-		27	33.98	21.29		5	3.08	7.23		25	30.75	48.35		15	32.32	45.10		32	186.85	199.80	
Avg/Percent	28.46	46.27	66.56	31.0	0.28	0.11	0.18	45.1	5.88	6.50		14.2	2.34	0.85		11.5	0.59	0.60		15.9	2.31	3.14		-	-	-		23.9	1.26	0.79		4.4	0.62	1.45		22.1	1.23	1.93		13.3	2.15	3.01		28.3	5.84	6.24	

Lowell, Massachusetts
NPDES No. MA0100633)

Summary of Nine Minimum Control Measures Program Modifications
2013 Annual Report

Permit Item Part I.F.3.d

The Lowell Regional Wastewater Utility (LRWWU) submitted a Nine Minimum Control Measures (NMC) Report in April 1998 that documented and evaluated existing NMCs in Lowell's combined sewer system and considered enhancements to those existing measures. The report was approved by the U.S. Environmental Protection Agency and the MA Department of Environmental Protection.

This document provides a summary of the current NMCs and modifications that were considered and implemented last year.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Proper Operation and Maintenance Programs	LRWWU has a comprehensive system operation and maintenance program that is designed to prevent dry weather overflows and minimize CSO discharges. The program includes regular inspection of all critical CSO facilities and pumping stations; performance of routine/preventive maintenance; and provisions for immediate emergency response to avoid unnecessary diversion of sanitary or combined wastewater. In addition to inspection and maintenance programs, LRWWU utilizes a SCADA system to continuously monitor all CSO diversion stations. Numerous SCADA alarms have been set up for immediate awareness of equipment malfunction and process upsets. Recent modifications and a complete system upgrade have improved the reliability of this monitoring program, with all conditions electronically recorded on a continuous basis. Modifications to the Merrimack, Beaver Brook, Tilden Street, Warren, West Street, and Read Street CSO Diversion Stations have improved operations and reduced maintenance at these stations. LRWWU has also upgraded the Data Management and Reporting Software. This has allowed LRWWU to report and analyze process data more efficiently. **Achieved Minimum Control**	LRWWU continues to meet its commitment to its operational and maintenance programs and continues to make improvements to each of its CSO and pumping stations to improve the capture of wet weather flow and reduce untreated CSO discharges. While existing operations and maintenance practices are sufficient to monitor, maintain and operate the combined sewer system, LRWWU is evaluating the effectiveness of an enhanced Computerized Maintenance Management System (CMMS). A determination will be made whether such a system would improve the scheduling of preventative maintenance tasks that would affect the overall operation of the WWTF and the satellite facilities.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Maximize Use of Collection System for Storage	In 2008, LRWWU upgraded its SCADA network to improve the reliability of remotely-controlled equipment The Head Operator at the WWTF, utilizes the SCADA system to operate a network of programmable logic controllers (PLCs) to remotely control gates and pumps at eight diversion stations. Modifications to the CSO Stations' gates and equipment have caused an increase in upstream interceptor system pipeline storage and have significantly minimized CSO discharges. This has resulted in enhanced control and monitoring of wet weather flows in the combined sewer system. Recently-completed improvements to gate operations at the West Street and Warren CSO Stations have led to the utilization of additional storage capacity in the North Bank Interceptor and the Concord River Interceptor, respectively. LRWWU routinely inspects the interceptor system, regulators, pumping facilities, and flap gates and have not identified any operational problems or blockages that are limiting storage maximization. LRWWU has completed a holistic evaluation of wet weather flow storage in its interceptor system. This evaluation, referred to as High Flow Management (HFM), is described in detail in a March 2010 report submitted to USEPA and MADEP. The results of LRWWU's HFM assessment are as follows: 1) optimum gate actuation set points have been enabled; 2) a standard protocol for wet weather operations is being implemented; 3) a substantial opportunity for additional interceptor storage has been identified at Read Station. A PLC program is currently being utilized to automatically control gates at West and Merrimack stations. These gates control the flow of combined sewage to the Duck Island WWTF. The PLC program is designed to maximize flow to the WWTF while minimizing the discharge of CSOs by balancing storage in both the North Bank and South Bank interceptors. **Achieved Minimum Control**	LRWWU has installed real-time depth monitors in its interceptor system to evaluate the current use of in-line interceptor storage. LRWWU will evaluate the data from wet weather events to identify system modifications and operational improvements that would enhance the capture of CSOs and maximize storage. An interceptor storage project at Read Station is currently being designed. Through this project, flow control gates will be added to the interceptor system at Read Station. This project will allow LRWWU to fully utilize the available pipe storage in the 96-inch diameter North Bank Interceptor, resulting in an additional one million gallons of in-line storage. In 2012, LRWWU hired a contractor to perform a flow assessment at 24 different locations throughout the city of Lowell. There were also 3 groundwater meters set up to evaluate the groundwater levels This flow assessment was used to monitor wet weather flows and is currently being analyzed so that LRWWU can evaluate their in-line interceptor storage and can prioritize areas for future sewer separation. LRWWU will continue to monitor and record CSO activations and the operating depth of the upstream interceptors. Where practical, LRWWU will modify operations to maximize the use of the collection system for CSO storage.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Pollution Prevention Programs	There are a number of pollution prevention programs currently implemented by LRWWU that help to reduce the impact of extraneous pollution in CSO discharges. These include street sweeping, catch basin cleaning, catch basin labeling, hazardous waste collection, litter control programs, pet waste management, garbage collection, recycling, and city ordinances prohibiting dumping and requiring erosion control and stormwater retention at developments. LRWWU has upgraded the catch basin identification plaques from rubber to metal plaques. These metal plaques are more durable and can withstand the harsh weather conditions. These plaques read, No Dumping; Flows to River" and contain more colors to attract the public's attention. In 2013, LRWWU labeled about 127 catch basins and will continue this program until all catch basins are properly labeled. This program educates the public about the effects of illicit dumping and promotes ownership in the public drainage system. **Achieved Minimum Control**	As part of its NPDES Phase II Stormwater and CSO Programs, LRWWU will update the WWTF's website and distribute brochures that help to increase public awareness of the stormwater and CSO pollution issues. As LRWWU continues its sewer separation program, public outreach is utilized to inform local residents of pollution prevention issues.
Control of Solids and Floatable Materials in CSO Discharges	Non-structural solids and floatable control technologies such as street sweeping, catch basin cleaning, and sewer system maintenance are performed by LRWWU and the City of Lowell to remove solids and floatables before they enter the receiving water. LRWWU has reverted to in-house street sweeping operations in order to minimize the transport of solids into the combined sewer system. The City of Lowell's Department of Public Works has purchased new equipment and will once again be responsible for this control measure. In addition, LRWWU is contracting its catch basin cleaning operations to an outside vendor along with using in-house cleaning. This combined effort will ensure that catch basins are cleaned on a set schedule, thus improving solids capture rates in the combined sewer system. Beaver Brook, and Walker Stations screen their influent wastewater for solids and floatable materials using bar screens. These bar screens are maintained and cleaned, as needed, on a daily basis. It is not practical or cost-effective to implement additional solids and floatable control technologies at LRWWU's other CSO diversion structures. **Achieved Minimum Control**	LRWWU continues to maintain CSO screening equipment, and clean catch basins along with contracted help on a daily basis. New street cleaning and salting vehicles have greatly reduced the amount of solids and floatables in CSO discharges and in LRWWU's sewer system.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Prohibiting CSO Discharges During Dry Weather	No Dry Weather Overflows have been noted during regular inspections of the CSO Diversion Structures and combined sewer system. LRWWU remotely monitors its CSO Diversion Stations. All conditions are continuously monitored at each of the stations and alarms alert the Head Operator at the WWTF if any CSO discharges occur. Recent upgrades to the SCADA system have improved the reliability of the control and monitoring CSO diversion stations, thus reducing the possibility of a dry-weather CSO discharge. LRWWU has upgraded its Influent Pumping Station which includes new screw pumps and new emergency generators. These improvements resulted in more reliable wet weather operations at the WWTF, which will reduce the possibility of a dry-weather CSO discharge. Also, the School Street Pump Station, an unreliable pumping station, has been replaced. This upgrade further reduces the possibility of dry-weather discharges from Lowell's combined sewer system. LRWWU monitors the equipment at all CSO stations daily. Head Operators at the LRWWU continue to keep a close watch on all SCADA alarms and interceptor levels, to prevent any CSO discharges during dry weather. **Achieved Minimum Control**	LRWWU is satisfied with their preventive actions against CSO Discharges during Dry Weather. No new modifications are being considered during this time.
Review and Modification of the Industrial Pretreatment Program	The Industrial Pretreatment Program, including its compliance reporting, provides LRWWU with the mechanism to monitor and control metals and other pollutants generated from industrial wastewater dischargers that are served by the combined sewer system. **Achieved Minimum Control**	LRWWU continually updates this program and its sewer use permit discharge standards to meet updated state and federal regulations. LRWWU is in the process of developing a Hauled Waste and septage program. This program will include permitting and continuous monitoring of all Hauled Waste and septage haulers. LRWWU is also evaluating the local limits and will revise these limits once the evaluation process is complete.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Maximizing Flows to the LRWWU Wastewater Treatment Facility	The Wastewater Treatment Facility (WWTF) is operated at its full practical flow/treatment capacity during every storm event to maximize treatment of combined sewer flow that might otherwise be discharged as untreated CSOs. In order to fully achieve its goal of maximizing flows to the WWTF, LRWWU has upgraded its existing influent pumping station. All four screw pumps have been replaced. Since upgrading the screw pumps, LRWWU has had some problems pumping flows through the WWTF. Some of the screw pumps have malfunctioned, but are currently operable. Head Operators at the LRWWU have been forced to run these screw pumps in hand mode. Continuously monitoring flows, the Head Operators can currently maximize flows through the WWTF manually. In addition to new screw pumps, LRWWU has upgraded its electrical system, including its emergency generators, to ensure that a reliable power source is available to operate the WWTF. These power supply and pumping improvements, coupled with earlier WWTF upgrades to aeration and solids processing, will lead to full utilization of the WWTF treatment capacity during high flow conditions. In order to fully understand the actual treatment capacity of the WWTF, LRWWU has completed a preliminary study on treatment capacity. This evaluation focused on peak primary and secondary treatment capacities, as well the overall performance of the WWTF. All flows to the plant receive primary treatment. Wet weather flow greater than the secondary aeration system capacity is directed around the secondary system and blended with secondary effluent before disinfection and discharge to the Merrimack River. **Achieved Minimum Control**	LRWWU strives to maximize the use of in-line interceptor pipeline storage capacity, which will ultimately maximize the use of available treatment capacity at the WWTF for wet weather flow to avoid untreated CSO discharges. To further maximize flows to the WWTF, LRWWU is currently analyzing wet weather data to determine the most efficient way to run the influent screw pumps

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Public Notification	In 2006, the existing program was modified to include: • *Outfall signs visible from both water and land*. LRWWU installed signs that are visible from both sides of each outfall**.** • *Signs/Notices at recreational areas impacted by CSOs*. LRWWU prepared a notice that was placed on all existing bulletin boards or kiosks located at all public boat launches, swimming areas, or recreational access points to the river. This notice advises the public about the existence of CSO discharges and the potential health risks posed by use of the river during rainfall events because of CSO discharges. • *Quarterly posting of CSO discharges on website*. LRWWU created a website that posts quarterly information on CSO discharges from its combined sewer system. • *Annual notification of CSO abatement progress*. LRWWU's website will be updated annually to include information regarding the implementation of the LTCP and the progress achieved in reducing CSO discharges. • *Notice to downstream river users of CSO discharges*. LRWWU verbally notifies downstream river users within 24 hours of a CSO discharge. This program was expanded to include other interested downstream individual or agencies such as the shellfish wardens and harbormasters. The downstream users are officially notified – via email – of a wet weather event (CSO discharge or secondary bypass) within ten days of its occurrence. **Achieved Minimum Control**	LRWWU continues to develop a website that will help to inform the public about the Lowell Regional Wastewater Utility operations and its CSO program. Over time, LRWWU expects to post information on the Internet regarding its LTCP and sewer separation programs and progress on CSO abatement.

Minimum Control Measure	Current Practices / Modifications Implemented	Modifications Considered
Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls	LRWWU submitted a Long-Term Control Plan (February 2002) that fully characterized Lowell's combined sewer system, including its diversion structures, outfall discharges, pollutant loads, and receiving water impact. The Long-Term Control Plan (LTCP) also developed alternatives and a phased set of recommendations to reduce CSO discharges. LRWWU originally installed long-term gauges to monitor flows and CSO discharges during the implementation of the LTCP. The gauging program became increasingly expensive and ineffective. As a result, LRWWU utilized an alternative method of flow monitoring that is currently being implemented – direct measurement of CSO discharges using open channel flow measurement principles. LRWWU has installed a system-wide SCADA system to help monitor and control CSO discharges. Multiple level monitoring devices have been installed at each CSO diversion structure to measure flow through the structure, control operations, and to estimate CSO discharges. Level measurements are used with open-channel flow measurement formulae to estimate flow discharged through various diversion-gate openings. CSO volumes through gate openings are modeled as flow through orifices or flow over weirs. These level measurements are connected to local PLCs for data storage and operational control. All of the collection system PLCs are connected by radio telemetry to the WWTF, where operators monitor and record interceptor flows and CSO discharges. LRWWU recently completed a major initiative to verify the existing SCADA/communications networks for monitoring and gathering CSO flow information in the system. This endeavor has also resulted in the development and verification of automatic, electronic reporting systems to facilitate the compilation of system data, especially with regard to wet weather operations. **Achieved Minimum Control**	LRWWU continues to work on verifying and enhancing the accuracy of CSO flow measurements. LRWWU has initiated a program to systematically monitor key CSO stations to verify flow formulae that are used by the data collection and reporting systems. LRWWU has verified CSO flow measurements in two of the four key CSO diversion stations and will continue to work on verifying the CSO flow measurements in the other diversion stations. LRWWU also installed level monitoring devices and used the information, along with existing system data, to analyze operations and determine how existing procedures and wet weather controls can be enhanced to reduce untreated CSO discharges. LRWWU had installed twenty-four (24) temporary flow meters to collect flow and level data at key locations in its collection system. This monitoring data is currently being analyzed and will be used to develop a sewer system model that will predict the system's response to various high flow conditions. The model will be critical in evaluating the efficacy of CSO controls implemented in LRWWU's Phase I LTCP, especially the use of in-line interceptor storage and the reduction of wet weather flow into the system as a result of the ongoing sewer separation program.

LOWELL REGIONAL WASTEWATER UTILITY

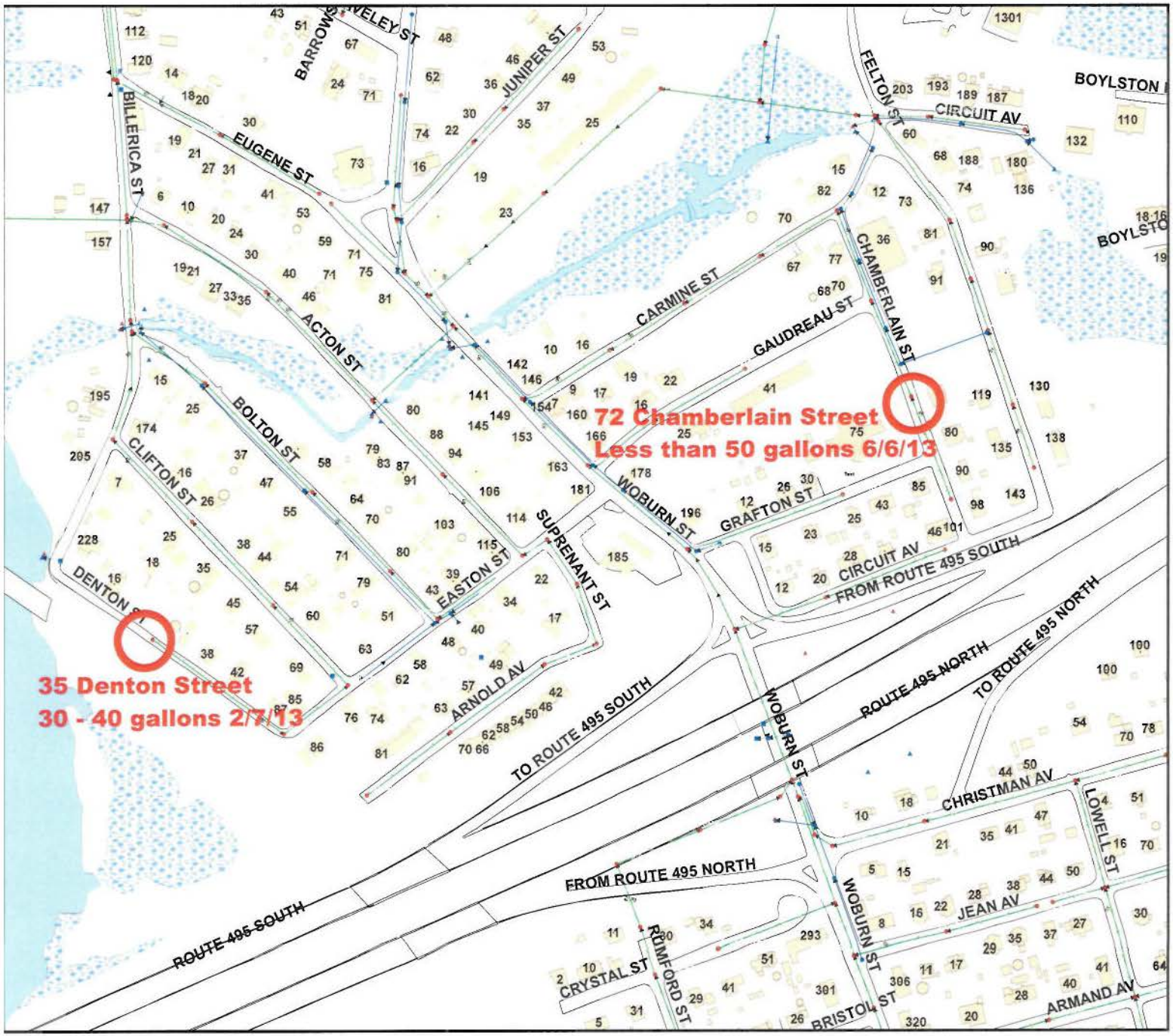
2013 CMOM ANNUAL REPORT

April 2014

2013 CMOM ANNUAL REPORT SUMMARY

This CMOM Program Implementation Annual Report outlines the actions taken by LRWWU for the 2013 calendar year for compliance with the September 2010 Administrative Order. The items addressed in this report are as follows:

- A description of the Corrective Actions taken in 2013 and how successful these actions were in mitigating the deficiencies.
- A Summary listing of all unauthorized discharges. The City of Lowell had 2 SSOs reported in the 2013 calendar year. A Summary Table and Location Map of unauthorized discharges is included herein. The summary includes the location, date and time, source of notification, cause, discharge volume, ultimate fate of discharge, and mitigation measures to correct the situation.
- A description of the measures taken by LRWWU to reduce the deficiencies identified in the corrective action self-assessment program.
- A description of the City of Lowell's GIS system and how LRWWU utilizes the system for location and mapping the collection system.
- A description of LRWWUs collection system maintenance budget. The description includes job descriptions, vacant positions and responsibilities.
- A description of LRWWUs measures to reduce extraneous flows through sewer separation and infiltration and inflow during the previous calendar year.
- A description of LRWWUs manhole location and restoration program.
- A description of LRWWUs plans for future corrective action of outstanding deficiencies identified in the self-assessment evaluation.



City of Lowell
Massachusetts

LRWWU Unauthorized Discharges SSO

- Sewer Manhole
- Drain Manhole
- Drain Catch Basin
- Sewer Force Main
- Sewer Gravity Main
- Drain Pipe
- CB Lateral
- Outfall GPS
- Roads
- Building

Waterways

Type

- Pond
- River
- Wetlands

1 inch = 104 feet

Date: 4/1/2014

2013 LRWWU CMOM Annual Report

2013 LRWWU Unauthorized Discharges (SSO's)

Location	Date and Time	Source of Notification	Cause	Estimated Discharge Volume	Ultimate Fate of Discharge	Mitigation Measures
35 Denton Street	2/7/13 8:28 am - 10:00 am	Resident	Frozen force main	30-40 gallons	Ground surface (no release to surface water)	LRWWU repaired the forcemain, cleaned and disinfected the area. No additional complaints have been received.
72 Chamberlain Street	6/6/13 9:36 pm – 10:51 pm	Resident	Sewer main blocked	Less than 50 gallons	Into Property Basement.	LRWWU cleared the sewer main of the blockage. Discharged backup to sewer. Cleaned and disinfected basement. No additional complaints have been received.

2013 CORRECTIVE ACTION MEASURES ADDRESSED AND EVALUATION OF THE MEASURES' SUCCESS

In conformance with the September 2010 Administrative Order, Article IV.8, LRWWU has developed a CMOM Corrective Action Plan and has identified deficiencies that are to be corrected. LRWWU has addressed a number of deficiencies as summarized below, as well as the effectiveness of the actions taken:

- Identified the need to implement an electronic record of odor complaints received by the public related to the sewage collection system and at the Duck Island Wastewater Treatment Facility. The corrective action was to develop a system that will allow proper tracking. LRWWU began comprehensive use of the e-gov system that has fully addressed this deficiency. It is the intent of LRWWU to utilize CMMS system in the future to augment the functionality of e-gov and provide integrated recordkeeping throughout the Facility. **Evaluation: Tracking the odor complaints via e-gov received by the Duck Island Wastewater Facility and the associated collection system has resulted in increased efficiency responding to and correcting these complaints.**

- Documented a need for a vehicle to maintain a record of sewer system blockages that occur within the collection system. The corrective action to this deficiency was to maintain a record of all sewer system activities, such as blockages, overflows and resulting conditions. Again, LRWWU is currently utilizing e-gov as a system to correct this deficiency. **Evaluation: Utilizing the e-gov system has successfully addressed maintaining the historical data of sewer system blockages that occur each year. This data collection system has served to identify problematic areas and identify other locations that must be focused on to prevent future capacity issues.**

- Recognized the need for a system of recording customer complaints of the sewer system infrastructure. LRWWU is currently utilizing e-gov for this purpose as well and fully corrected this deficiency. **Evaluation: As stated above, the use of e-gov recording of complaints of customer complaints of the sewer system infrastructure is successful in identifying the complaints and addressing the source of the problem in a timely manner.**

- Developed a schedule for cleaning sewers within the collection system. LRWWU has committed to cleaning 5 miles of sewer per year with an emphasis on those sewers with a diameter of less than 24", as those are the critical locations that would most likely pose a unfavorable condition. In addition, LRWWU has implemented a pipe cleaning contract to remove heavy debris, thereby correcting this deficiency. **Evaluation: LRWWU has continued to investigate the condition of the sewer system and cleaning of the sewer system has been performed on a regular basis as committed. This maintenance**

schedule has resulted in proactively reducing backups and failures within the collection system.

- Identified a deficiency in Sanitary Sewer Overflow (SSO) notification, monitoring, and reporting. Corrective action to resolve the deficiency would be maintenance of a record of all SSOs, and notification to appropriate plant personnel and agencies. LRWWU has created SSO overflow forms to be submitted to the agencies following an event. These forms will also be copied to LRWWU Managers. Where the LRWWU is responsible for maintenance of sewers only on city property and does not maintain private sewer services, reporting is limited to LRWWU owned system only. **Evaluation: Two SSOs occurred in 2013. The program instituted to record and distribute information to all applicable parties on the SSOs has created a knowledgebase of areas that may need rehabilitation, and therefore encourages further investigation of the system to improve public health and safety.**

- Identified the need for a policy of managing and tracking scheduled and unscheduled collection system work orders regarding complaint response, maintenance events, equipment tracking, and inventory. To correct this deficiency, LRWWU instituted a protocol for scheduled and unscheduled work orders that are currently being managed through LRWWU's MP2 tracking software. A detailed description of the protocol is located in the attached Annual Report. **Evaluation: The policy has resulted in improving the efficiency of response to unscheduled (emergency) situations by maintaining the necessary inventory that has facilitated taking the corrective action quickly when necessary to do so.**

In summary, the deficiencies detailed above have been adequately addressed during this reporting period.

2013 CORRECTIVE ACTION MEASURES PENDING

In conformance with the September 2010 Administrative Order, Article IV.8, LRWWU has developed a CMOM Corrective Action Plan and has identified deficiencies that are to be corrected. LRWWU has addressed a number of deficiencies address as of this report as summarized below:

- The 2011 report identified the need for a written emergency response plan. The corrective action to be taken is currently in progress to develop a plan for when these emergency situations arise. LRWWU is currently undergoing development of an emergency response plan program and protocol for contacting appropriate department personnel and agencies to successfully resolve collection system failures and mitigate these emergencies if they occur. The plan is being developed integral with the LRWWU Integrated Contingency Plan which is targeted to be completed by August 2014. **The basis of implementation of an emergency response plan has begun including training at different levels on how to respond to emergency situations and remediate potential hazards.**

- Identified the need for determining the capacity of the existing sewer system to accommodate new connections. LRWWU is in the process of proposing a system of sewer connection permits and for the purpose of sewer system capacity evaluation. The assessment and responsibility will be a dedicated agency for this purpose. **In 2013, a hydraulic modeling project for the sewer system was undertaken as part of LRWWU's Final LTCP to control CSOs. This modeling will be used to inform LRWWU's plan to eliminate CSO discharges.**

- Identified the need for a protocol for estimating infrastructure value. LRWWU is currently seeking valuation of its infrastructure from the city's chief financial officer.

- The 2014 goals of the collection department are to:

  1) Line approximately 4,000' of sewer mains to stop infiltration and exfiltration and secure the integrity of the pipes.

  2) Clean approximately 1,200 CBs. While cleaning CBs they will also be inspected for any repairs that need to be performed.

  3) Rod and clean approximately 70,000' of sewer mains to prevent any future blockages. Also, as the cleaning is done are video truck will be inspecting the lines and record any defects that need attention.

  4) Additionally, the video truck will continue its preventative maintenance program throughout the city to inspect the infrastructure and have any defects repaired before they become a major problem, therefore reducing long-term operational costs. The vacuum trucks will continue their preventative maintenance work orders on our pump stations, cleaning the grit and grease out of the wet-wells.

In summary, the deficiencies detailed above have been adequately addressed during this reporting period by LRWWU.

LOWELL GIS OVERVIEW

Geographic Information Systems is a computer-based system for capture, storage, retrieval, analysis and display of locationally defined (spatial) data. GIS is one of the basic building blocks of the City's technology offerings. The goal is to deploy GIS throughout the organization, improving the way services are delivered to residents and businesses. To this end, GIS supports the databases, develops applications, and provides technical assistance to a growing base of users. The Lowell GIS system was last updated on February 2014.

The City of Lowell GIS is based on 2013 aerial photogrammetric mapping at a 1"=100' scale. These maps were to meet or exceed National Map Accuracy Standards (NMAS). These standards ensure that other data, such as municipal parcel maps, compiled using similar specifications can be overlaid without major discrepancies, and that ground coordinates can be derived from the map to a stated accuracy. Lowell GIS data uses the North American Datum of 1983 (NAD83) Massachusetts State Plane Feet.
Lowell GIS parcel and boundary lines are compliant to the MassGIS Level 2 Standard for parcel files in which the city received a grant of $25,000.

GIS has been integrated into many city applications such as Larimore Public Safety for 911, Crimeview (Crime Analysis), Vision Property Appraisal, MUNIS permit system, VHB Road Manager (Pavement Management) .Lowell GIS layers include building locations, address information, parcel properties, street centerline network, railroads, waterway/wetlands areas, flood plains, paved roadways, schools, neighborhood boundaries, census data, election wards and districts, police and fire stations and sectors, historical landmarks, special needs locations, zoning, trash day schedule, sewer and water facility infrastructure.
GIS uses within city departments include Planning and Development, Public Safety (Police and Fire), Engineering, Public Works, Health, Emergency Management, Inspectional Services and Special Events. Lowell Regional Wastewater Utility has done extensive GIS utilization, projects include:

- Sewer System O&M – LRWWU's collection system staff utilize GIS extensively for operation and maintenance (O&M) of the sewer system. The Collection System Supervisor has Lowell's GIS maps, with the Lowell sewer system, available on a laptop in his vehicle. This enables the supervisor to quickly familiarize himself with the local sewers and identify all relevant information about the system. Having this information available in the field allows for expeditious resolution of sewer back-ups and other O&M issues. Other LRWWU personnel also have access to the sewer system maps and information. The GIS tools facilitate the execution of utility mark-outs, system characterization, and trouble-shooting tasks, making all system O&M tasks more efficient.
- In addition to in-house O&M requirements, GIS will assist LRWWU in complying with the new EPA-mandated CMOM (Capacity, Maintenance, Operations & Management) requirements.
- Sewer Inspection – LRWWU owns and operates a sewer inspection vehicle that records video that integrated in Lowell's GIS. Through its sewer inspection program, LRWWU has identified countless defects that have led to several miles of sewer rehabilitation and more than $5 million in sewer improvements.
- Drainage System Characterization – LRWWU is embarking on an ambitious effort to identify and characterize all drainage outfalls into local waterways within the extents of the City of Lowell. This program is mandated by EPA's recent stormwater regulations and enforced through the city's MS-4 Stormwater Permit. Through this program, the locations of all drainage outfalls are captured and integrated into Lowell's GIS. All other drainage pipes are also integrated into GIS, including more than five miles of new drains that have been installed in LRWWU's sewer separation program. In this program, LRWWU has invested nearly $50 million to upgrade its drainage system. Having these assets integrated into GIS will allow LRWWU to better operate and maintain them.
- Project Design and Planning – Almost $50 million has been invested into LRWWU's Long-Term Control Plan (LTCP) program to control combined sewer overflows (CSOs). Lowell's GIS has been utilized extensively to plan and design six construction projects that have resulted in the installation of

more than ten miles of new drains, sewers, and water mains in the past five years. Without GIS, it is unlikely that this work could have been completed as successfully.

- Property Development – LRWWU is able to assist property developers when they need information about local utilities. Lowell's GIS has information on water, sewer, drain, and gas utilities, allowing developers to effectively plan their projects.
- Resident Support – When residents inquire about local utilities, LRWWU is able to provide relevant information immediately. Of particular value to home-owners are records of their sewer services. Although these records are not available through the Internet, they are provided upon request.
- Spill containment– Using GIS LRWWU is able to provide quick access to information in determining what is affected downstream of the spill and where to set up spill containment pads.

Lowell GIS On-line Web Services

Developed as a means to provide access to Lowell GIS data through a website application and as a component for E-government services. Incorporating an internal Intranet alongside an external Internet presence Using GIS web services a user can search by criteria such as parcel address or street name and the Lowell GIS site will return an interactive map of the location requested. This allows users to view GIS data, query databases linked to GIS, view related documents and print maps.

GIS Website Descriptions

General internal site

- This GIS Site displays the general GIS layers available. Examples of general GIS data layers include base mapping (roadways, buildings, property and address locations, water bodies, neighborhood, zoning boundaries, conservation review areas, historic board review areas, Assessors tax parcels and Assessor property data linked to the parcels.

Wastewater Utility internal site

- This GIS Site displays the general GIS layers available as well as Wastewater Department specific layers. Examples of Wastewater Department GIS data layers are the city sanitary sewer and drain network including sewer and drain pipes and wastewater infrastructures as well as other relevant GIS layers. Lowell also has developed a ArcGIS server website for retrieval and display of sewer tie card scans in the field

- This GIS Site designed for the general public through the city website (http://www.lowellma.gov). This displays the general GIS data layers include base mapping (roadways, buildings, property and address locations, elevation model, trash day schedule, election wards and polling locations, neighborhood, zoning boundaries, Assessors tax parcels and Assessor property data linked to the parcels as well as other relevant GIS layers.

Future GIS Projects

- Asset Management – LRWWU is preparing to use Lowell's GIS to support its asset management program. This program will be implemented in 2011, after the selection and start-up of a CMMS software program. LRWWU will track its assets for condition, preventative maintenance, and life-cycle costs. Considering the substantial assets operated and maintained by LRWWU, the CMMS should prove to be a valuable tool for managing the City of Lowell's assets.
- ERSI is moving GIS software v 9.3 to v 10.2 in spring of 2014.

COLLECTION SYSTEM MAINTENACE ACTIVITIES

PREVIOUS & CURRENT FISCAL YEAR BUDGETS

The Lowell Regional Wastewater Utility Maintenance Division dedicates nine employees at an annual cost of approximately $350 k to the City's collection system. Eighty five percent of their time is actual work performed on the system with approximately fifteen percent downtime associated with weather and collection equipment repairs.

In addition to in-house maintenance activities, LRWWU invests more than $1 million annually for contractors to clean, repair and replace aging sewer and drain lines throughout the city. A contractor who is responsible to respond to LRWWUs needs on a daily basis performs both planned and emergency repairs. Street sweeping is performed twice per year to remove debris that would otherwise make its way into the sewer collection system. A hired contractor performs routine catch basin cleaning, thus preventing debris captured in these catch basins from migrating into the combined sewer system.

For 2012, LRWWU awarded a Contract of $1.4 million dollars for sewer rehabilitation using cured-in-place-pipe CIPP lining for the fiscal years 2013 – 2015. This program will address failing, deteriorated, leaking of infiltrating sewers that have been identified in the Lowell collection system. During 2013 LRWWU paid Menino Construction $730,000 for collection system repair/construction.

In addition to the contracted services, two LRWWU owned and operated sewer/vacuum trucks perform daily catch basin cleaning and sewer/drain line rodding. Two personnel are assigned on a daily basis to perform inspections at all CSO diversion stations, pump stations, and metering stations. This includes routine maintenance such as cleaning of manual bar racks, removing screenings, back-flushing pumps and making minor repairs as needed.

Another resource that is utilized daily is a full-time, state of the art, video truck. This enables the Utility to inspect an average of 50-60 thousand feet of sewer and drain lines each year. Since purchasing this vehicle in 2008, LRWWU has been able to identify numerous deficiencies. Identifying, and subsequently correcting these deficiencies, has allowed LRWWU to be very proactive with its sewer rehabilitation program in critical locations, thus preventing much more problematic events from occurring.

The Head Collection Supervisor is on call at all times and manages all aspects of the collection system maintenance program, including scheduling of the vacuum truck and television truck crews. Other maintenance activities include, but are not limited to, managing repair contractors, implementing a root treatment program and a heavy cleaning program, overseeing any litigation proceedings or damage claims, and recording all work in a computer database and obtaining permits required for contractors.

In August 2007, the Lowell City Council approved a $5.5 Million sewer rehabilitation fund to be earmarked for the repair and replacement of the Lowell sewer system. A copy of the loan order is included in this report. With its aging sewer system susceptible to catastrophic failure, the city recognized the need to address this serious vulnerability by earmarking funds specifically for sewer rehabilitation. These funds are in addition to the line items in LRWWU's O&M budget that are detailed below. Altogether, annual collection system funding totals nearly $2 million.

WASTEWATER		FY12 Actual	FY13 Approved	FY14 Request	FY14 Manager
Personnel					
Salaries & Wages - Perm		2,417,882	2,603,499	2,680,817	2,680,817
Salaries & Wages - Temp		10,781	26,000	26,000	26,000
Overtime		202,469	220,000	220,000	220,000
Holiday		18,404	25,000	25,000	25,000
Shift Differential		32,944	38,000	38,000	38,000
License Incentive		1,100	2,500	3,200	3,200
Longevity		1,142	1,150	1,150	1,150
Sick Leave Incentive		26,711	27,000	27,500	27,500
	Total	2,711,434	2,943,149	3,021,667	3,021,667
Expenses					
Energy - Heating/Gas		950,027	1,400,000	1,400,000	1,350,000
Repair & Maint Bldgs & Grounds		436,087	700,000	700,000	700,000
Sludge Removal		2,227,547	2,950,000	2,900,000	2,900,000
Police - Special Detail		50,284	70,000	70,000	70,000
Rental of Equipment		3,330	15,000	15,000	15,000
Uniform Rental		11,182	20,000	20,000	20,000
Professional Services		242,235	480,000	530,000	530,000
Training Safety		24,707	45,000	45,000	45,000
Postage		2,623	12,000	9,000	9,000
Gas & Motor Oil Supplies		54,995	70,000	70,000	70,000
Chemical Supplies		598,390	750,000	660,000	660,000
Laboratory Supplies		29,042	66,000	66,000	66,000
Office Supplies		8,000	8,000	8,000	8,000
Misc. Supplies - Other		6,000	6,000	6,000	6,000
In- State Seminars		260	1,000	1,000	1,000
Out of State Travel		-	700	700	700
Misc Charges		12,421	16,000	16,000	16,000
Vehicle Capital Plan		24,280	-	-	-
Office Furn. & Equipment		9,355	9,900	9,500	9,500
Elevator Repairs		3,111	25,000	25,000	25,000
ISO 14001		-	37,600	5,000	5,000
WWTP Collection					
Contract Street Sweeping/CB Cleaning		338,795	255,000	255,000	255,000
Remote Diversions		2,200	8,000	8,000	8,000
GIS Work		4,668	15,000	15,000	15,000
Improve Sewers & Drains		7,733	15,000	15,000	15,000
Inspection San Sewer		805,264	840,400	840,400	840,400
	Total	5,852,536	7,815,200	7,889,600	7,839,600
	TOTAL BUDGET	8,563,970	10,758,349	10,911,267	10,861,267

COMMONWEALTH OF MASSACHUSETTS

CITY OF LOWELL

In City Council

LOAN ORDER

To borrow $5,500,000 for the purpose of financing the costs of sewer system line cleaning and pipe assessment, targeted replacement and rehabilitation of inadequate sewer lines to reduce extraneous flows into the sewer collection system and wastewater treatment plant and to improve the capacity and integrity of the sewer collection system.

IT IS ORDERED BY THE CITY COUNCIL OF THE CITY OF LOWELL BY A TWO-THIRDS VOTE as follows:

Ordered: That the sum of $5,500,000 is appropriated for sewer system line cleaning and pipe assessment, targeted replacement and rehabilitation of inadequate sewer lines to reduce extraneous flows into the sewer collection system and wastewater treatment plant and to improve the capacity and integrity of the sewer collection system, including without limitation all costs thereof as defined in Section 1 of Chapter 29C of the General Laws; that to meet this appropriation the Treasurer with the approval of the City Manager is authorized to borrow $5,500,000 and issue bonds or notes therefor under G.L. c.44 and/or Chapter 29C of the General Laws or any other enabling authority; that such bonds or notes shall be general obligations of the City unless the Treasurer with the approval of the City Manager determines that they should be issued as limited obligations and may be secured by local system revenues as defined in Section 1 of Chapter 29C; that the Treasurer with the approval of the City Manager is authorized to borrow all or a portion of such amount from the Massachusetts Water Pollution Abatement Trust established pursuant to Chapter 29C and in connection therewith to enter into a loan agreement and/or a security agreement with the Trust and otherwise to contract with the Trust and the Department of Environmental Protection with respect to such loan and for any federal or state aid available for the project or for the financing thereof; that the City Manager is authorized to enter into a project regulatory agreement with the Department of Environmental Protection, to expend all funds available for the project and to take any other action necessary to carry out the project; and that the Treasurer is authorized to file an application with the Municipal Finance Oversight Board to qualify any or all of the bonds under G.L. c.44A and to provide such information and execute such documents as such board may require for these purposes.

Order recommended and introduced by:
/s/Bernard F. Lynch
Bernard F. Lynch
City Manager

In City Council July 10, 2007, Given 1st Reading and hearing ordered for 7PM on August 14, 2007. So Voted./s/Richard C. Johnson, City Clerk
In City Council August 14, 2007, Given 2nd Reading and hearing held. No Remonstrants. Hearing closed. Adopted on roll call vote 9 yeas. So Voted./s/Richard C. Johnson, City Clerk
Adopted by City Manager Bernard F. Lynch August 15, 2007.
A true copy
ATTEST:

Richard C. Johnson, City Clerk
Loanorder/sewers

COLLECTION SYSTEM JOB DESCRIPTIONS

The Lowell Regional Wastewater Utility Maintenance Division currently dedicates nine employees to the operation and maintenance of its collection systems. Full-time positions include one (1) Collection Systems Head Operator, two (2) Video Inspection Operators, and six (6) Mechanics. The following pages contain detailed job descriptions for each of the positions.

JOB TITLE: **HEAD COLLECTION SYSTEM OPERATOR**

SECTION: **WASTEWATER**

REPORTS TO (JOB TITLE):

MAINTENANCE SUPERVISOR

MAINTENANCE SUPERINTENDENT

MAY REPORT TO: **HEAD ELECTRICIAN**

JOB TITLES SUPERVISED: **MECHANIC Is**

MECHANIC IIs

MECHANIC IIIs

TV INSPECTION OPERATORS

JOB TITLE: HEAD COLLECTION SYSTEM OPERATOR

JOB PURPOSE: Ensures proper maintenance of entire sewer system in a safe, cost effective and efficient manner complying with all regulations

ESSENTIAL JOB RESULTS:

1. SUPERVISE SUBORDINATES, MAINTAINS STAFF JOB RESULTS
   By
   - o Assigning and delegating tasks
   - o Coordinating work activities
   - o Inspection and check of Mechanics work and job performance
   - o Coaching and counseling Mechanics
   - o Recommends disciplinary action
   - o Participates in the disciplinary process

2. MAINTAINS SEWER SYSTEM
   By
   - o Coordinating all activities
   - o Installation of new equipment
   - o Maintenance inspection and repair of all existing systems

3. MAINTAINS COLLECTION SYSTEM
   By
   - o Training subordinates
   - o Having a thorough knowledge of the collection system, structures, policies and procedures
   - o Following policies and procedures
   - o Carrying out assignments

- o Ensuring working order of equipment
- o Ensure subordinates perform their requirements
- o Reporting and recording abnormalities
- o Taking corrective action
- o Reporting needed changes
- o Required to carry a cell phone

4. ENSURES PROPER OPERATION OF SEWER SYSTEM
   By
   - o Performing preventative maintenance requirements
   - o If needed, follow manuals, schematic diagrams,blueprints, and other specifications
   - o Troubleshooting

5. MAY INSTALL NEW EQUIPMENT/MAKE REPAIRS TO EXISTING EQUIPMENT
   By
   - o Using all equipment available
   - o Managers and coordinates wastewater contractors

6. REPAIR AND MAINTAIN SEWER SYSTEM AND ALL ASSOCIATED STRUCTURES
   By
   - o Diagnosing problems
   - o Informing user(s) if necessary
   - o Informing Maintenance Superintendent and/or Maintenance Supervisor
   - o Coordinating repairs with outside contractors and/or City Engineer and/or related City departments

7. CONTROLS DOWNTIME OF SEWER SYSTEM
   By
   - o Expediting needed repairs and/or cleanings in a timely manner

8. COORDINATES ROUTINE AND EMERGENCY WORK
   By
   - o Informing outside contractors of needs
   - o Directs and operates equipment and personnel where required

9. MAINTAINS SEWER COLLECTION EQUIPMENT, PARTS AND SUPPLY INVENTORIES
   By
   - o Checking stock to determine inventory level
   - o Anticipating needed equipment, parts, and supplies
   - o Reporting needs

10. CONSERVES SEWER SYSTEM RESOURCES
    By
    - o Using equipment and supplies as needed to accomplish job results

11. MAINTAINS SEWER COLLECTION EQUIPMENT
    By
    - o Performing minor repairs to all associated equipment
    - o Report any malfunctioning equipment

12. PROVIDES SEWER SYSTEM INFORMATION
By
- o Answering questions and requests

13. PREPARES SEWER SYSTEM REPORTS
By
- o Collecting, analyzing, and summarizing information and trends
- o Submitting written reports

14. MAINTAIN PROFESSIONAL AND TECHNICAL KNOWLEDGE
By
- o Attending educational workshops
- o Reviewing technical publications
- o Establishing personal networks
- o Maintain required licenses

15. MAINTAINS CONTINUITY AMONG WORK TEAMS
By
- o Documenting and communicating actions, irregularities and continuing needs

16. WORK SAFELY
By
- o Knowing and following facility safety rules and regulations
- o Attending in plant and outside safety seminars and courses
- o Reporting unsafe conditions
- o Consider safety aspects of jobs before assigning or performing
- o Keep subordinates informed and updated of safety procedure changes and updates

17. COORDINATE WITH OTHER CITY DEPARTMENT PERSONNEL
By
- o Availing needed resources
- o Oversees Pool Abatement Program

18. MAINTAINS CLEAN WORKING ENVIRONMENT
By
- o Assigning and performing housekeeping, custodial, and landscaping duties

19. HELPS THE PUBLIC
By
- o Being courteous
- o Investigate complaints promptly
- o Assure prompt action

20. CONTRIBUTES TO TEAM EFFORT
By
- O Accomplishing related results as needed

ENVIRONMENT

PHYSICAL DEMANDS

_x_ Balancing _x_ Crouching _x_ Hearing SEEING _x_ Sitting

_x_ Carrying _x_ Feeling _x_ Kneeling _x_ Close _x_ Standing

_x_ Climbing _x_ Fingering _x_ Lifting _x_ Far _x_ Stooping

_x_ Crawling _x_ Grasping _x_ Pulling _x_ Color _x_ Talking

_x_ Depth _x_ Walking

EXPOSURES

_x_ Airborne Particles _x_ Explosives _x_ Muscular strain _x_ Temperatures

_x_ Caustics _x_ Fumes _x_ Noise _x_ Toxicants

_x_ Chemicals _x_ High places _x_ Odors _x_ Vibrations

_x_ Electrical _x_ Moving parts _x_ Vision strain _x_ Weather

SUPERVISORY-MANAGEMENT RESPONSIBILITY

__ Hire/discipline/terminate _x_ Assign and check work _x_ Train

_x_ Plan/appraise job results

Number of employees supervised 1 - 15

JOB TITLE:	**TELEVISION INSPECTION OPERATOR**
SECTION:	**WASTEWATER**
REPORTS TO (JOB TITLE):	**MAINTENANCE SUPERINTENDENT**
	HEAD COLLECTION SYST OPERATOR
MAY REPORT TO:	**MAINTENANCE SUPERVISOR**
	PLANT ELECTRICIAN
	INSTRUMENTATION ELECTRICIAN
JOB TITLES SUPERVISED:	**NONE**

JOB PURPOSE: Set up and operation of TV Inspection equipment, including cameras, winches and all related equipment. Perform video inspection of wastewater utility collection system infrastructure.

ESSENTIAL JOB RESULTS:

1. Operates the TV camera and video related equipment associated with internal pipeline inspections.

2. Participates in precision shop and fieldwork calibrating, troubleshooting, installing, repairing and maintaining internal pipeline inspection equipment.

3. Performs preventive maintenance on all related equipment to insure its dependability and readiness.

4. Insures the vehicle is fully stocked at all times to insure immediate response.

5. Insures all equipment is secured daily or when left unattended.

6. Orders and maintains inventory of necessary supplies.

7. Insures vehicle and all related equipment is always presented in a clean and workmanlike condition.

8. Locates sources of problems with all equipment
   BY:
   Observing all equipment in operation
   Observes and Listens for problems during equipment operation
   Making necessary repairs

9. Removes defective equipment
   BY:
   Dismantling device
   Using necessary tools available

10: Controls Downtime

BY:

Performing preventive maintenance

Making repairs, adjustments or new installation as expeditiously as possible

Performing Mechanic I duties that may include, but not be limited to, operating the vaccon trucks, CSO and pump station inspections, screenings removal and other duties, etc.

Performing all other duties assigned

11. Provides television information

BY:

Answering questions

Passing on information

Maintaining video library of work performed

12. Performs required television equipment maintenance

BY:

Performing repairs to television equipment

Troubleshooting and making recommendations to accomplish job results

Operate television equipment and vehicle

13. Installs new equipment

BY:

Using hand and power tools and measuring devices

14. Performs preventive maintenance

BY:

Knowing lubrication and adjustment requirements on related equipment

Maintaining a clean work environment

15. Maintains professional and technical knowledge

BY:

Attending educational workshops, seminars and courses

Reviewing professional publications

Maintaining required licenses

16. Helps the public

BY:

Being courteous

Investigating complaints promptly

Assuring prompt action

17. Works safely

BY:

Knowing facility rules and regulations

Attending in-house and outside safety seminars and courses

Reporting unsafe conditions

18: Maintains clean work environment

BY:

Performing housekeeping and custodial duties

19. Contributes to team effort

BY: Accomplishing related results as needed

QUALIFICATIONS, EDUCATION AND EXPERIENCE:

Basic reading, writing, mathematical, oral and written communications.

Understanding of basic mechanical concepts associated with pipeline inspection equipment as required through five years of related experience.

Understanding of basic mechanical and electronic concepts associated with inspection equipment or any equivalent combination of education and/or experience.

KNOWLEDGE, SKILLS AND ABILITIES:

The understanding of pipeline inspection equipment and applicable safety practices and principles.

Ability to read and interpret record plans, drawings, and blueprints.

Must possess a valid motor vehicle operator's license.

Excellent interpersonal, written and oral communication skills required.

TOOLS AND EQUIPMENT USED:

Office Equipment as normally associated with the use of personal computer including word processing and other software, copy and fax machines.

PHYSICAL DEMANDS:

The physical demands described here are representative of those that must be met by an employee to successfully perform the essential function of this job.

Reasonable accommodations may be made to enable individuals with disabilities to perform essential functions.

While performing the duties of this job, the employee is regularly required to use hand to finger, handle, feel or operate objects, tools or controls and reach with hands and arms. The employee frequently is required to stand and talk or hear. The employee is occasionally required to walk, sit, climb or balance; stoop, kneel, crouch or crawl; taste or smell.

The employee must frequently lift and/or move up to 50 pounds. Specific vision abilities required by this job include close vision and color vision, and the ability to adjust focus.

WORK ENVIRONMENT:

The work characteristics described here are representative of those an employee encounters while performing the essential function of this job.

While performing the duties of this job, the employee occasionally works in various field settings and in an office environment. The employee regularly work near moving mechanical parts, and is occasionally exposed to risk of vibration.

The noise level in the work environment is a moderately loud office setting.

JOB TITLE: MECHANIC I

SECTION: WASTEWATER

REPORTS TO (JOB TITLE): MAINTENANCE SUPERVISOR

HEAD COLLECTION SYSTEM OPERATOR

MAINTENANCE SUPERINTENDENT

MAY REPORT TO: HEAD ELECTRICIAN

INSTRUMENTATION ELECTRICIAN

MECHANIC III

MECHANIC II

JOB TITLES SUPERVISED:
MAY SUPERVISE: OTHER MECHANIC I'S

JOB TITLE: MECHANIC I

JOB PURPOSE: Ensure proper maintenance of Wastewater Collection System and Wastewater Treatment Facility in a safe, cost effective and efficient manner, complying with all regulations BY Performing required collection system duties and preventative maintenance and repairs to all mechanically related equipment at the facility including troubleshooting.

ESSENTIAL JOB RESULTS:

1. PERFORM REQUIRED COLLECTION SYSTEM MAINTENANCE
   By
   - o Operating/performing repairs to collection equipment
   - o Troubleshooting and making recommendations to accomplish job results
   - o Operating collection system vehicles and equipment

2. MAINTAINS OUTLYING STRUCTURES
   By
   - o Knowing structure procedures, operation and purpose
   - o Performing proper troubleshooting techniques
   - o Inspecting, repairing, cleaning and checking structures

3. REPAIRS AND MAINTAINS SEWER SYSTEM AND ALL ASSOCIATED STRUCTURES
   By
   - o Diagnosing problems
   - o Informing user(s) if necessary
   - o Informing Head Collection System Operator

4. CONSERVES SEWER SYSTEM RESOURCES
   By
   o Using equipment and supplies as needed to accomplish job results

5. PROVIDES SEWER SYSTEM INFORMATION
   By
   o Answering questions and requests

6. LOCATES SOURCE OF PROBLEMS
   By
   o Observing mechanical devices, vehicles and equipment in operation
   o Listening for problems
   o Making necessary repairs and/or recommendations

7. REMOVES DEFECTIVE PARTS
   By
   o Dismantling devices
   o Using hoists, backhoe, hand and power tools

8. CONTROLS DOWNTIME
   By
   o Making repairs, adjustments, or new installations as expeditiously as possible
   o Expediting sewer system cleaning in a timely manner

9. FABRICATE REPAIR PARTS
   By
   o Using any maintenance equipment/materials

10. CONSERVES MAINTENANCE RESOURCES
    By
    o Using equipment and supplies as needed to accomplish job results

11. PROVIDES MECHANICAL MAINTENANCE INFORMATION
    By
    o Answering questions and requests
    o Passing on information

12. PERFORM PREVENTIVE MAINTENANCE
    By
    o Knowing lubrication and adjustment requirements on all equipment

13. MAINTAINS PROFESSIONAL AND TECHNICAL KNOWLEDGE
    By
    o Attending educational workshops, seminars, and courses
    o Review professional publications
    o Maintain required licenses

14. HELPS THE PUBLIC
    By
    o Being courteous
    o Investigate complaints promptly
    o Assure prompt action

15. INSTALLS NEW EQUIPMENT
By
o Using hand, power tools and measuring devices

16. MAINTAINS CLEAN WORKING ENVIRONMENT
By
o Performing housekeeping, custodial and landscaping duties

17. WORK SAFELY
By
o Knowing facility safety rules and regulations
o Attending inplant and outside safety seminars and courses
o Reporting unsafe conditions
o Consider safety aspects of assignments before performing them

18. CONTRIBUTES TO TEAM EFFORT
By
o Accomplishing related results as needed

ENVIRONMENT

PHYSICAL DEMANDS

_x_ Balancing _x_ Crouching _x_ Hearing SEEING _x_ Sitting

_x_ Carrying _x_ Feeling _x_ Kneeling _x_ Close _x_ Standing

_x_ Climbing _x_ Fingering _x_ Lifting _x_ Far _x_ Stooping

_x_ Crawling _x_ Grasping _x_ Pulling _x_ Color _x_ Talking

_x_ Depth _x_ Walking

EXPOSURES

_x_ Airborne Particles _x_ Explosives _x_ Muscular strain _x_ Temperatures

_x_ Caustics _x_ Fumes _x_ Noise _x_ Toxicants

_x_ Chemicals _x_ High places _x_ Odors _x_ Vibrations

_x_ Electrical _x_ Moving parts _x_ Vision strain _x_ Weather

SUPERVISORY-MANAGEMENT RESPONSIBILITY

__ Hire/discipline/terminate __Assign and check work _x_ Train

DESCRIPTION OF EXTRANEOUS FLOW REDUCTION PROGRAMS

The City of Lowell has 220 miles of sewer pipes, nearly half of which are more than 100 years old. Numerous sewer lines are installed outside public ways, traversing wetlands or underneath buildings. In recent years, there was growing concern that a failed line in a precarious location could be disruptive, dangerous, and expensive.

In addition to compromised structural integrity, the aging sewers were also leaking, allowing significant amounts of infiltration into the system. This infiltration exacerbates difficulties with inflow into the combined sewer system during wet weather, which leads to higher flows at the wastewater treatment facility and larger volumes of combined sewer overflows (CSOs).

Shortly after initiating a $5.5 M sewer rehabilitation fund in 2007, the city invested in a sewer inspection vehicle, with real-time video capabilities to assess the condition of underground sewers. To date, more than two hundred thousand feet of sewer lines have been inspected and Lowell has spent $3.5 M rehabilitating its sewer system. Several critical sewer lines have been replaced or rehabilitated with a CIPP (cast-in-place-pipe) lining method.

Approximately 60% of Lowell's sewer system is combined, resulting in substantial inflow from catch basins and other sources, including private inflow. Because sewer services are owned and maintained by private property owners, the City of Lowell does not inspect these private sewers. However, the city has implemented a sump pump disconnection program as part of several sewer separation projects. Since 2005, Lowell has invested more than $50 M in a sewer separation program that has resulted in the installation of more than fifteen miles of new drainage, removing inflow and reducing extraneous flow from hundreds of acres. In addition, nearly nine miles of sewer lines were replaced or lined as part of the sewer separation program.

Plans are being developed for another phase of sewer separation projects that will continue to remove additional inflow and rehabilitate the combined sewer system. A prioritization list of future rehabilitation projects has been developed and a plan is in place to address these priorities.

DESCRIPTION OF MANHOLE LOCATION PROGRAM

There are approximately 5,000 manholes in the City of Lowell's drainage, sewer and combined sewer collection system. The Lowell Regional Waster Water Utility (LRWWU) locates sewer and drain manholes as part of the sewer collection system maintenance plan on a continual basis. Each manhole is individually numbered and identified in the Lowell GIS system. Sewer manholes are prefixed in GIS with "SMH", and drain manholes are prefixed as "DMH" followed by exclusive identification numbers for both types of structures to allow for straightforward differentiation between the type of structure.

The manholes are typically located by the LRWWU video truck (as described in the Collection System Maintenance Activities discussed in the previous section) during the process of inspecting the infrastructure. The video crew identifies any buried manholes and marks them to be raised to grade. Additionally, as new construction projects are completed, LRWWU locates as-built structures by GPS survey instrumentation. GIS is then systematically updated to incorporate the research information obtained by each of the methods of location employed.

As part of the manhole location program, LRWWU conducts inspection of the collection system via the above process and periodically replaces manholes along with the associated manhole frames and covers as determined to be necessary during inspection by the collection system personnel.

During 2013, LRWWU workers located and raised 15 manholes. In addition, a total of 177 catchbasins and 55 manholes were repaired.

DESCRIPTION OF ANTICIPATED CMOM CORRECTIVE ACTIONS

- The 2011 report identified the need for a written emergency response plan. The corrective action to be taken is currently in progress to develop a plan for when these emergency situations arise. LRWWU is currently undergoing development of an emergency response plan program and protocol for contacting appropriate department personnel and agencies to successfully resolve collection system failures and mitigate these emergencies if they occur. The plan and training is in the process of being developed integral with the LRWWU Integrated Contingency Plan.

- Identified the need for determining the capacity of the existing sewer system to accommodate new connections. LRWWU is in the process of proposing a system of sewer connection permits and for the purpose of sewer system capacity evaluation. The assessment and responsibility will be a dedicated agency for this purpose.

- Identified the need for a vehicle basis for estimating infrastructure value. LRWWU is currently seeking valuation of infrastructure from the city's chief financial officer.

- The 2014 goals of the collection department are to:

  1) Line approximately 3,669' sewer mains to stop infiltration and exfiltration and secure the integrity of the pipes.

  2) Clean approximately 1,200 CB's. While cleaning CB's they will also be inspected for any repairs that need to be performed.

  3) Rod and clean approximately 70,000' of sewer mains to prevent any future blockages. Also, as the cleaning is done are video truck will be inspecting the lines and record any defects that need attention.

  4) Additionally, the video truck will continue its preventative maintenance program throughout the city to inspect the infrastructure and have any defects repaired before they become a major problem, therefore reducing long-term operational costs. The vacuum trucks will continue their preventative maintenance work orders on our pump stations, cleaning the grit and grease out of the wet-wells.

Attachment No. 1

United States Environmental Protection Agency, EPA New England

Wastewater Collection System CMOM Program Self-Assessment Checklist

Name of your system Lowell Regional Wastewater Utility **Date** 4-2-14

Put an "A" in the final column for an issue you intend to address with future action, or leave blank if you have evaluated your program as sufficient.

I. General Information – Collection System Description

I	Question	Response	*Act
1	Identify the number of people currently served by your wastewater collection system.	108,522. (source MIS census report 2012)	
2	Identify the number of service connections to your collection system. Specify the number of residential, commercial, and industrial connections. Provide a list of the commercial and industrial connections. Provide the number of manholes, pump stations, force mains, and siphons. Provide the length (in feet or miles) of gravity sewers and force mains? List by size and type.	25,000 service connections; 5,000 manholes; 24 pump stations; 24 force mains; 22 siphons; 176 miles of gravity sewers and force mains; 8 inch to 120 inch pipe - clay, brick, ductile iron, RCP, and PVC.	
3	What is the age of your system (e.g., percentage over 100, 75, 50, 30, etc. years old)?	47.3% of sewers > 75 years old 14.2% of sewers > 50 years old and < 75 years old 9.5% of sewers > 25 years old and < 50 years old 15.0% of sewers < 25 years old 14.1% of sewers are unknown age	
4	Type(s) and age of collection system maps that are available and what percent of the system is mapped by each method (e.g., paper only, paper scanned into electronic, digitized, interactive GIS, etc.)?	Paper maps (75% of collection system); GIS (90% of sewer collection system); sewer service records – paper and electronic (75% of sewer service connections) .	
5	Indicate whether you have a systematic numbering and identification method/system to identify sewer system manholes, sewer lines, and other components (pump stations, etc.). Please describe.	Yes, everything is systematically numbered and uniquely identified. Sewer manholes are labeled as SMH with a number to follow. Drain manholes are labeled as DMH with a number to follow. Sewer lines are labeled by size and structural make-up. Pump stations are only labeled by name (not numerically).	
6	Are "as-built" plans (record drawings) or maps available and used by field crews in the office and in the field?	Yes .	
7	Describe the type of asset management (AM) system you use (e.g. card catalog, spreadsheets, AM software program, etc.)	LRWWU's asset management system is a combination of spreadsheets, GIS mapping and MP2 v 6.1 software. We also have paper and electronic sewer service records.	

* Put an "A" in the final column if this is an issue you intend to address with future action.

II. Continuing Sewer Assessment Plan

II	Question	Response	*Act
1	Describe under what conditions, if any, the collection system overflows. Does it overflow during both wet and dry weather? Characterize common causes of overflows: □ hydraulic capacity, □ debris, □ roots, □ Fats, Oils & Grease (FOG), □ vandalism, □ other (specify). Describe your system's history of structural collapses, and PS or force main failures.	The collection system is a combined sewer system in ~60% of the city. Typically, there are no dry weather overflows in the combined sewer system; and no known sanitary sewer discharges in the separated portions of the collection system. Combined sewer overflows occur in the combined sewer system, only during wet weather conditions. The most common cause of CSOs is hydraulic restrictions at diversion stations, siphons, and the WWTF. LRWWU has not had any force main failures, or any structural collapses or pump station failures that resulted in a CSO discharge. An aggressive maintenance policy has been implemented to reduce CSOs by video and cleaning of the collection system which has resulted in a significant reduction of overflows.	
2	Provide the number of sanitary sewer overflows (SSOs), including building and private property backups, that have occurred in each of the last three calendar years. In an attachment, provide the date, location, cause, volume and fate of the discharge for each SSO event.	LRWWU had a total of 7 SSO incidents in the last three years. Five were in 2011, zero in 2012. and two were in 2013. Attached is a list of the particulars of each incident.	
3	Describe how you responded to the building and private property backups listed in II.2, including how you document the response, result of the investigation into the cause, and the ultimate fate of the discharge.	Everything is documented in our E-Gov system and on our sewer complaint form, which is manually filled out by staff. We respond by dispatching personnel immediately. If a problem is private, the owner takes responsibility (sewer services are privately owned from the sewer main to the building). If it's a problem with the public sewer system, then LRWWU either handles the issue in-house or we have our emergency contractor respond.	
4	What is the ratio of peak wet-weather flow to average dry-weather flow at the wastewater treatment plant or municipal boundary for satellite collection systems?	The wastewater treatment facility experiences a 4 to 1 change in flow rate during wet weather conditions. Flow in excess of downstream storage and/or treatment capacity is discharged as a CSO.	
5	Describe short-term measures that have been implemented or planned to mitigate overflows at each location. If actions are planned, when will they be implemented for each location?	LRWWU performed a High Flow Management analysis that included installing meters in our large-diameter interceptor system so that we could better characterize the system. As a result, we are able to maximize flow to the WWTF, maximize storage in the interceptor system, and substantially reduce CSO diversion volumes.	
6	Describe long-term measures that have been implemented or planned to mitigate overflows at each location. If actions are planned, when will they be	A $50 M sewer separation program has been completed; and $40 M WWTF upgrade projects are done. Through LRWWU's high flow management program, existing infrastructure is fully utilized. Future phases of CSO control will focus on a combination of additional sewer separation,	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	implemented for each location?	as well as new storage and wet-weather treatment facilities. The schedule for future phases is undetermined at this time.	
7	Describe preventive maintenance programs; how are they tracked (e.g., card files, electronic spreadsheets, specific software)? Do you have a system to prioritize investigations, repairs and rehabilitation?	LRWWU's preventative maintenance program consists of using MP2 software to track all preventative maintenance work in the collection system. We deploy our own camera truck to video inspect sewer lines, with particular emphasis on older sewer lines. A standard "1 to 5" rating system is used, with a "5" indicating immediate repair/replacement and a "1" indicating good condition. Projects to mitigate overflow are indicated in the LRWWU LTCP phase 2 report to be issued June 2014.	
8	Are chronic problem areas systematically identified and tracked? Is there an established schedule for more frequent maintenance for problem areas? How are these maintenance regimes tracked and evaluated? Is there an established program to identify and address underlying causes for problem areas?	There are no known problems areas in the separated sewer system. Problem areas are systematically identified and tracked and have been the basis for recent improvements through our sewer separation program and our sewer rehabilitation program. We have a schedule for more frequent preventative maintenance in areas that have been problematic in the past. Everything is tracked through a work order system and overseen by senior management. We have a sewer rehabilitation program that addresses problematic areas and prioritizes these areas.	
9	If septage is accepted, are haulers required to declare the origin of their load? Are records of these declarations maintained? Are these declarations used to identify potential SSOs?	Yes, we do receive the origins of septage loads through a hauling manifest system. Records are maintained in a paper filing system. We do not use these records to identify potential SSOs, where the vast majority of septage haulers pump from septic tanks outside of the Lowell collection system's service area.	

III.A. Collection System Management Organizational Structure

III A	Question	Response	*Act
1	Provide an organizational chart that shows the overall personnel structure for collection system operations, including operation and maintenance staff.	See Exhibit A	
2	Provide up-to-date job descriptions that delineate responsibilities and authority for each position.	See CMOM Annual Report	
3	How many staff members work on collection system maintenance? If these workers are also responsible for other duties, (e.g., road repair or maintenance, O&M of the storm water collection system), what percentage of their time is dedicated to the collection system?	Typically, there are seven crew members working on the collection system on a daily basis. Except for severe wet weather or other unusual events, 100% of the collection system crew's time is dedicated to working on collection system maintenance.	
4	Are there any collection	No vacancies	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	system maintenance position vacancies? How long have these positions been vacant?		
5	For which, if any, maintenance activities do you use an outside contractor?	We use a single contractor for all replacement, repairs, or upgrades to the collection and drainage system structures, except for pump stations or CSO diversion stations, which we perform in-house or contract separately. We utilize dedicated contractors perform periodic cleaning of catch basins, as well as street sweeping. We also have a contractor perform root treatment of our collection system.	
6	Describe any group purchase contracts you participate in.	Chemical purchases and catch basin cleaning are organized with Merrimack Valley Wastewater consortium.	

III.B. Collection System Management: Training

III B	Question	Response	*Act
1	What types of training are provided to staff?	LRWWU provides an aggressive safety training program; for instance, CPR, AED, slips and falls, fire prevention, confined space entry, Lock-out Tag-out, Spill Response and HAZWOPER, Right-to-Know, Emergency Response, Fork Lift, etc. We also provide in-house, on-the-job training and new equipment training.	
2	Is training provided in any of the following areas: □ general safety, □ routine line maintenance, □ confined space entry, □ MSDS □ lockout/tagout, □ biologic hazards, □ traffic control, □ record keeping, □ electrical and instrumentation, □ pipe repair, □ public relations, SSO/emergency response, □ pump station operations and maintenance, □ trenching and shoring, □ other (explain)?	Training is typically provided annually for the above listed training topics.	
3	Which training requirements, if any, are mandatory for key employees?	Training is mandatory; all employees are required to participate.	
4	How many collection system employees are certified (e.g. NEWEA certification program) and at what grade are they certified?	26 certifications total 1 - collection grade 1 20 - collection grade 2 1 - collection grade 3 4 - collection grade 4	

III.C. Collection System Management: Communication and Customer Service

III C	Question	Response	*Act
1	Describe your public education/outreach programs (e.g., for user rates, FOG,	We identify catch basins with plaques, we distribute door handle fliers, and we implement sump pump identification/disconnection projects. We also conduct	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	extraneous flow, SSOs etc.)?	tours of the WWTF.	
2	What are the most common collection system complaints? How many complaints have you received in each of the past three calendar years?	Back ups and sinkholes are the most common complaint. Below are the number of recent complaints, the vast majority of which are private sewer service problems: 2013 = 1,213 2012 = 1,180 2011= 950	
3	Are formal procedures in place to evaluate and respond to complaints?	Yes, the City of Lowell manages an E-Gov complaint system through which all complaints are submitted via email and distributed to the proper individual. LRWWU then responds to the complaint in person and notifies the originator by email once the complaint has been resolved.	
4	How are complaint records maintained (e.g, logs, spreadsheets)? How are complaints tied to emergency response and operations and maintenance programs?	Complaint records are compiled from citizen phone and email which are maintained in our E-Gov online software and monitored for immediate action.	

III.D. Collection System Management: Management Information Systems

III D	Question	Response	*Act
1	How do you manage collection system information? (Commercial software package, spreadsheets, data bases, SCADA, etc). What information and functions are managed electronically?	We use MP2 software v 6.1. Everything is managed electronically through the software. We monitor the date work was done, the location, crew and hours, work completed, notable issues, and future work needed. SCADA is used to monitor daily collection and plant functions.	
2	What procedures are used to track and plan collection system maintenance activities?	Daily log sheets, field observations, equipment maintenance schedules, and manufacturer's suggested maintenance. We also use a camera truck to visually inspect and plan corrective actions.	
3	Who is responsible for establishing maintenance priorities? What records are maintained for each piece of mechanical equipment within the collection system?	The Head of Collection Systems and other management personnel. Full records are maintained through log books and MP2 software.	
4	What is the backlog for various types of work orders?	The current backlog is approx 2 weeks for non-emergency (preventative maintenance) items. Emergency items are rectified within 24-hours.	
5	How do you track emergencies and your response to emergencies? How do you link emergency responses to your maintenance activities?	Everything is tracked through the MP2 v 6.1 work order software. Everything is considered to be a work ordered task. All notable conditions or comments are described in the work order for any emergency.	
6	What written policies and protocols do you have for managing and tracking the following: scheduled and	LRWWU instituted a protocol utilizing MP2 v 6.1 software to track work orders thereby improving efficiency of response of necessary corrective actions including emergency responses.-However, we are	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	unscheduled work orders, including complaint response? Scheduled inspections and preventative maintenance? Safety incidents and emergency responses? Compliance and overflow tracking? Equipment and tools tracking? Spare parts inventory?	planning to develop protocols for managing collection system maintenance tasks through a computerized maintenance management system (CMMS).	

III.E. Collection System Management: SSO Notification Program

III E	Question	Response	*Act
1	What are your procedures, including time frames, for notifying state agencies, health agencies, regulatory authorities, and the drinking water authorities of overflow events?	LRWWU follows the standard DEP SSO/Bypass procedure and notification forms to report these incidents. These reports are filed promplty after the incident occurs, all authorities are notified at the time of the incident.	
2	Do you use a standard form to record and report overflow events? Provide a copy of the form that is used.	The standard DEP SSO form is used for reporting to all parties requiring notification.	

III.F. Collection System Management: Legal Authority

III F	Question	Response	*Act
1	Are discharges to the sewer regulated by a sewer use ordinance (SUO)? Does the SUO contain procedures for controlling and enforcing the following: □ FOG; □ defects in service laterals located on private property; □ building structures over the sewer lines; □ storm water connections to sanitary lines; □ sump pumps, roof drains and other private sources of inflow; □ Infiltration and Inflow (I/I);?	Yes, discharges to the sewer system are regulated by a SUO.	
2	Who is responsible for enforcing various aspects of the SUO? Does this party communicate with your department on a regular basis?	The Pretreatment Department is responsible for enforcing the SUO; this group continually communicates with the maintenance department.	
3	Summarize any SUO enforcement actions/activities that have occurred in the last three calendar years.	None	
4	Is there a program to control FOG entering the collection system? If so, does it include the following elements: □ permits, □ minimum performance criteria, □ inspection □ enforcement? Are commercial grease traps inspected	No program in place at this time. The Pretreatment Coordinator is informed by the Lowell Health Department during their regular inspections of grease traps if any issues have developed that would impact the system.	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	regularly? Who is responsible for inspections and enforcement?		
5	Is there an ordinance dealing with storm water connections or requirements to remove storm water connections?	The Lowell Sewer Use Ordinance (SUO) prohibits the discharge of stormwater into the sewer system.	
6	Does the collection system receive flow from satellite communities? If yes, which communities? How are flows from these satellite communities recorded and regulated? Are satellite flow capacity issues periodically reviewed?	Yes, the plant receives flow from four towns – Chelmsford, Dracut, Tewksbury and Tyngsboro. All are on continuous flow metering and periodically strength sampling. Satellite flow capacity issues are constantly being reviewed.	
7	Does the collection system receive flow from other collection systems (e.g. colleges and universities, military bases, or private collection systems)? If so, list these sources. How are flows from these collection systems recorded and regulated? Are there required inspection and maintenance programs? How are overflows addressed? How are overflows recorded and reported?	We do not have any private collection systems connected to LRWWU.	

IV.A. Collection System Operation: Financing

IV A	Question		*Act
1	Has an enterprise (or other) fund been established? Does it include: wastewater collection and treatment operations; collection system maintenance; long-term infrastructure improvements; etc.? Are the funds sufficient to properly fund future system needs?	LRWWU operates through an enterprise fund system that supports all wastewater collection and treatment operations, all collection system maintenance, and all infrastructure improvements. The funds are sufficient for the projected years.	
2	How are rates calculated (have you done a rate analysis)? What is the current sewer charge rate? When was the last increase? How much was the increase?	Rates are calculated based on generating necessary revenues for sustaining the enterprise fund. The rates are calculated on a tiered rate structure, with the lowest tier being $2.985 per Hundred Cubic Feet (HCF). The current rate structure was last revised in 2013 (a 4.8% increase).	
3	What is your O&M budget?	$10,758,349 for Fiscal Year 2013 (most recent final budget)	
4	If an enterprise fund has not been established, how are collection system maintenance operations funded?	We have an established enterprise fund. Detailed budget information is attached.	
5	Is there a Capital Improvement Plan (CIP) that provides for system repair/replacement on a prioritized	Yes, there is a CIP. The average annual collection system CIP budget for the past five years has been $1.2 million dollars per year.	

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	basis exist? What is the collection system's average annual CIP budget?		
6	How do you account for the value of your system infrastructure for the Government Accounting Standards Board Standard 34 (GASB 34)?	LRWWU is currently seeking valuation of infrastructure from the city's chief financial officer.	A

IV.B. Collection System Operation: Hydrogen Sulfide Monitoring and Control

IV B	Question	Response	*Act
1	Are odors a frequent source of complaints? How many have been received in the last calendar year? List location(s) of complaints.	Odor complaints are not common. In 2013 there were a total of 8 complaints in the collection system	
2	Do you have a hydrogen sulfide problem, and if so, do you have corrosion control programs? What are the major elements of the program?	LRWWU does not have a Hydrogen Sulfide problem.	
3	Does your system contain air relief valves at the high points of the force main system? If so, how often are they inspected? How often are they exercised?	We do not have any relief valves; there is nothing to maintain.	

IV.C. Collection System Operation: Safety

IV C	Question	Response	*Act
1	Do you have a formal Safety Training Program? If so, how do you maintain safety training records?	As stated above, LRWWU provides an aggressive safety training program; for instance, CPR, AED, slips and falls, fire prevention, confined space entry, Lock-out Tag-out, Spill Response and HAZWOPER, Right-to-Know, Emergency Response, Fork Lift, etc. We also provide in-house, on-the-job training and new equipment training. All records are maintained by the safety committee and are stored both electronically with hard copies of certification and other documentation located in the engineering department office.	
2	Are the following items are available and in adequate supply: ۞ rubber/disposable gloves; ۞ confined space ventilation equipment; ۞ hard hats, ۞ safety glasses, ۞ rubber boots; ۞ antibacterial soap and first aid kit; ۞ tripods or non-entry rescue equipment; ۞ fire extinguishers; ۞ equipment to enter manholes; ۞ portable crane/hoist; ۞ atmospheric testing equipment and gas detectors; ۞	Yes. Inspections of all safety devices are performed quarterly, or replaced when needed or used. PPE items are located throughout the facility and stations. All workers are provided with gas meters specific for the tasks to be performed and locations that will be entered. Fire extinguishers are located where necessary. First aid kits are located in all structures and AED units are installed in the main office and the maintenance building. Traffic control equipment is available for all vehicles. Life	

* Put an "A" in the final column if this is an issue you intend to address with future action.

	oxygen sensors; ⦿ H2S monitors; ⦿ full body harnesses; ⦿ protective clothing; ⦿ traffic/public access control equipment; □ 5-minute escape breathing devices; ⦿ life preservers for lagoons; □ safety buoys at activated sludge plants; ⦿ fiberglass or wooden ladders for electrical work; □ respirators and/or self-contained breathing apparatus; □ methane gas or OVA analyzer; ⦿ LEL metering?	preservers are at each of the process tanks.	

IV.D. Collection System Operation: Emergency Preparedness and Response

IV D	Question	Response	*Act
1	Do you have a written collection system emergency response plan? If so, when was the plan last updated? What departments are included in your emergency planning?	LRWWU has spill response policies, and multiple safety programs including emergency preparedness training and an ICP, however currently there is not a formalized emergency response plan. This plan is in the process of being developed.	**A**
2	Does the emergency response plan consider the following: □ vulnerable points in the system, □ severe natural events, □ a failure of critical system components, □ vandalism or other third party events (specify), □ other types of incidents (specify)?	LRWWU's current emergency response policies focus primarily on chemical spills and has a flood protection program. It does not currently consider equipment/infrastructure failure, vandalism, or severe natural events. The finalized program will address both expected and unforeseen events.	
3	How do you train staff to respond to emergency situations? Where are responsibilities detailed for personnel who respond to emergencies?	LRWWU provides approximately 20 hours of contracted safety training augmented with 4-8 hours of in-house training, and additional training is supervised on–the-job or first-hand training. Responsibilities are detailed in employee job descriptions and in the safety policies implemented by LRWWU.	
4	How many emergency calls have you had in the past calendar year? What was their nature?	In the past year, 1,213 calls were received, mostly back-ups in the sewer system. The majority of the back-ups are on private property, within residential service connections to the public sewer mains and there were very few emergency incidents.	

IV.E. Collection System Operation: Engineering – Capacity

IV E	Question	Response	*Act
1	How do you evaluate the capacity of your system and what capacity issues have you identified, if any? What is your plan to remedy the identified	Numerous level sensors, deployed in large-diameter interceptor pipes, are continuously monitored to ensure that no inadvertent overflows or back-ups occur. In 2013, a hydraulic modeling project for the sewer system was undertaken as part of LRWWU's Final LTCP to	**A**

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	capacity issues?	control CSOs. This modeling will be used to inform LRWWU's plan to eliminate CSO discharges.	
2	What procedures do you use to determine whether the capacity of existing gravity sewer system, pump stations and force mains are adequate for new connections? Who does this evaluation?	LRWWU Engineering department analyzes the capacity of the system to accept future flows.	
3	Do you charge hook up fees for new development and if so, how are they calculated?	The sewer connection fee for residential units is $0.01 per SF and for $0.05 per SF business/commercial.	
4	Do you have a hydraulic model of your collection system? Is it used to predict the effects of system remediation and new connections?	A revised hydraulic model, which incorporates significant recent sewer separation, storage, and rehabilitation improvements, was developed in 2013. This model will characterize the critical elements of the collection system and all sewers with known capacity constraints.	

IV.F. Collection System Operation: Pump Stations - Inspection

IV F	Question	Response	*Act
1	How many pump stations are in the system? How often are pump stations inspected? How many are privately owned, and how are they inspected? Do you use an inspection checklist?	We have 12 pump stations and 13 grinder pumps. The 12 pump stations are inspected every day. We do not maintain any stations that are privately owned. A log book is used for recording purposes.	
2	Describe backup equipment at pump stations. Is there sufficient redundancy of equipment at all pump stations?	There are spare pumps and generators installed at most pump stations and LRWWU has portable generators for the remaining stations. The stations have sufficient redundancy so that during any type of event the system can operate as designed.	
3	How are pump stations monitored? If a SCADA system is used, what parameters are monitored?	Most pump stations are monitored by auto dialers for level, pump overload and power status. Two of our stations are integrated into LRWWU's SCADA system; more upgrades are currently being performed.	
4	How many pump station/force main failures have you had in each of the last three years? Who responds to pump station/force main failures and overflows? How are the responders notified?	There was one force main failure due to a frozen pipe in 2013.	
5	How many pump stations have backup power? How many require portable generators? How many portable generators does your system own? Explain how portable generators will be deployed during a system-wide electrical outage.	Eight pump stations have back-up power generators on site; four pump stations require portable generators. We have one portable generator large enough to run one of these pump stations. The generator is deployed by collection system employees who tow the generator trailer to the site of the failure.	
6	Are operation logs maintained for all pump stations? Are the lead, lag, and backup pumps rotated regularly?	Yes, log books are maintained at all pump stations. Yes, all pumps are operated on a specified preventative maintenance schedule.	

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7	Are pump station operations adjusted (manually or automatically) during wet weather to maximize in-line storage of wet weather flows?	Yes, as specified in LRWWU's High Flow Management Plan.	

V.A. Equipment and Collection System Maintenance: Sewer Cleaning

V A	Question	Response	*Act
1	Do you have a schedule for cleaning sewer lines on a system-wide basis? At this rate, how long does it take to clean the entire system? How is sewer line cleaning recorded?	The majority of cleaning is performed where blockages are likely to occur such as smaller diameter sewers. Approximately 70,000 feet of sewer and 1,200 CBs are cleaned each year.	A
2	How do you identify sewer lines that have chronic problems and should be cleaned more frequently? Is a list of these areas maintained and cleaning frequencies established?	LRWWU has a video truck to inspect sewer lines to identify deficiencies. If a problem is detected, a maintenance schedule is established based on the inspection results. During 2013, 79,195 feet of sewer lines were inspected. A list is maintained and cleaning frequencies are established.	
3	Approximately, how many collection system blockages have occurred during the last calendar year, and what were the causes? How many resulted in overflows?	During 2013, 894 catch basin and sewer backups were resolved. Two resulted in over flows (SSOs). Both were resolved and no further complaints were logged.	
4	Has the number of blockages increased, decreased, or stayed the same over the past five years?	The number has continually decreased in the past five years, because of a preventative maintenance program and an extensive sewer separation program.	
5	What equipment is available to clean sewers? Is sewer line cleaning ever contracted to other parties? If so, under what circumstances?	There are two Vac-Con rodder/ vacuum trucks, a backhoe and a camera truck. Sewer line cleaning is not contracted. Heavy cleaning-and root treating are contracted.	
6	Do you have a root control program? Describe its critical components.	Yes, we have an annual contract used to control roots. The root control program is based on camera truck inspections of problematic pipes.	

V.B. Equipment and Collection System Maintenance: Maintenance Right-of-Way

V B	Question	Response	*Act
1	Is scheduled maintenance performed on Rights-of-Way and Easements? How often? How many manholes are located in easement areas? Are there problems locating and accessing these manholes. How many cannot be accessed or located? Are the manholes equipped with watertight and/or locking manhole covers?	There are approximately 500 manholes in easements. Manholes located in wetland areas are water-tight. Manholes located in public areas are locked for security. LRWWU does not schedule maintenance in easements. Work is performed on an as-needed basis.	
2	Are road paving operations coordinated with collection system operators. Are there manholes that	Yes, paving operations are coordinated between Lowell's DPW and LRWWU. Manholes are raised and uncovered as found. No manholes have been	

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	have been paved over? If so, how many manholes have been paved over? Describe systems in place to locate and raise manholes that have been paved over.	paved over in recent years. In cases where we need to locate a buried manhole, a camera with a GPS-locating device and metal detectors is used.	

V.C. Equipment and Collection System Maintenance: Parts Inventory

V C	Question	Response	*Act
1	Do you have a central location for the storage of spare parts?	There is a central location for spare parts within the maintenance garage (located at the WWTF).	
2	How have critical spare parts been identified?	The critical spare parts have been identified by location within the garage and inventory counts.	
3	How do you determine if adequate supplies are on hand? Has an inventory tracking system been implemented?	Supplies are ordered in bulk, based on past needs, and those parts are stored in the maintenance building. Whatever parts aren't in storage are ordered from vendors with a quick turn-around time.	

VI A. SSES: System Assessment

VI A	Question	Response	*Act
1	Do flow records, or prior I/I or Sewer System Evaluation Survey (SSES) programs indicate public or private sources of inflow? Please explain.	Yes, there are catch basins and sump pumps connected to the combined sewer system. Approximately 60% of Lowell's sewer basins are served by combined sewer systems. In 1995, LRWWU completed multiple assessments of the collection system. Areas of peak infiltration were predominately identified in the combined sewer areas. These areas are being systematically addressed through the LTCP Phase I program.	
2	If I/I studies or an SSES has been conducted? When were the studies conducted? What is the status of the recommendations? If no SSES or I/I have been conducted, is there a plan and schedule for conducting one?	I/I studies and sewer system evaluations have been routinely performed as part of LRWWU's Long Term Control Plan (LTCP) for CSO Control. In the past eight years, $50 M has been spent on sewer separation. During each separation project, every sewer line in the targeted drainage basin has been individually assessed for its condition. All pipes requiring rehabilitation to remove extraneous flow have either been replaced or lined. An annual I/I report is submitted to the USEPA, as required in LRWWU's NPDES permit.	
3	Do you have a program to identify and eliminate sources of I/I into the system including private service laterals and illegal connections? If so, describe.	Yes, this is detailed in the LTCP for CSO Control.	
4	Have private residences and businesses been inspected for sump pumps and roof leader connections? If so, how many have been inspected	Yes, approximately 10%	

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	what percentages of the total residences and businesses does this represent?		
5	Are inspections to identify illicit connections conducted during the property transfer process?	No	
6	How many sump pumps and roof leaders have been identified? How many have been removed?	A total of 400 have been identified and 350 have been removed.	
7	Have follow-up residential and business inspections been conducted?	No.	
8	Are there incentive programs to encourage residences and businesses to disconnect roof leaders & sump pumps (e.g. matching funds)?	Yes, the LRWWU paid for all disconnection work to be done for illicit sump pumps, with the homeowner responsible for only $100 for the sump pump itself.	
9	What disincentive programs exist to encourage residences and businesses to disconnect roof leaders & sump pumps (e.g. fines, surcharges)?	Lowell's Sewer Use Ordinance prohibits extraneous flow connections to the public sewer system, with provisions to assess fines for non-compliance.	

VI.B. SSES: Manhole Inspection

VI B	Question	Response	*Act
1	Do you have a manhole inspection and assessment program? If so, describe.	No, we currently do not have a manhole inspection and assessment program.	
2	Is a formal manhole inspection checklist used? If so, provide a copy.	We do not use a formal manhole inspection checklist. Manholes are repaired as part of the contractor inspections or complaints.	
3	How many manholes were inspected during the past calendar year? What percentage of the total number of manholes in system?	In the past year, 905 manholes were inspected - approximately 10% of our system inventory.	

VII. Energy Use

VII	Question	Response	*Act
1	What is your annual energy cost for operating your system? For which pieces of equipment do you track energy use?	For calendar year 2013, the electric use of the utility including WWTF and the remote stations was $1,042,714 of which $945,010 was attributed to the WWTF. The total gas was $71,790 of which $58,862 was attributed to the WWTF. Therefore, the total gas and electric operating costs for the Utility including the WWTF and remote stations was $1,114,504. All equipment is tracked and analyzed for usage. Additionally, the Utility received a Solar Panel Revenue of $6,203.	
2	Have you upgraded any of your pumps and motors to more energy efficient	No	

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	models? If so, please describe.		
3	Have you performed an energy audit in the past three years?	No	
4	Where do you use the most energy (fuel, electricity) in operating your collection system?	The majority (90.1%) of energy use is attributed to the WWTF. The remainder of energy usage is attributed to most of the pump stations.	
5	If you have a treatment plant, would you be interested in participating in EnergyStar benchmarking of your treatment plant?	No.	

VIII. Other Actions

VIII	Question	Response	*Act
1	Describe any other actions that you plan to take to improve your CMOM Program that are not discussed above.	Implementing an upgraded software program for better tracking and controls for staff utilization and asset management.	

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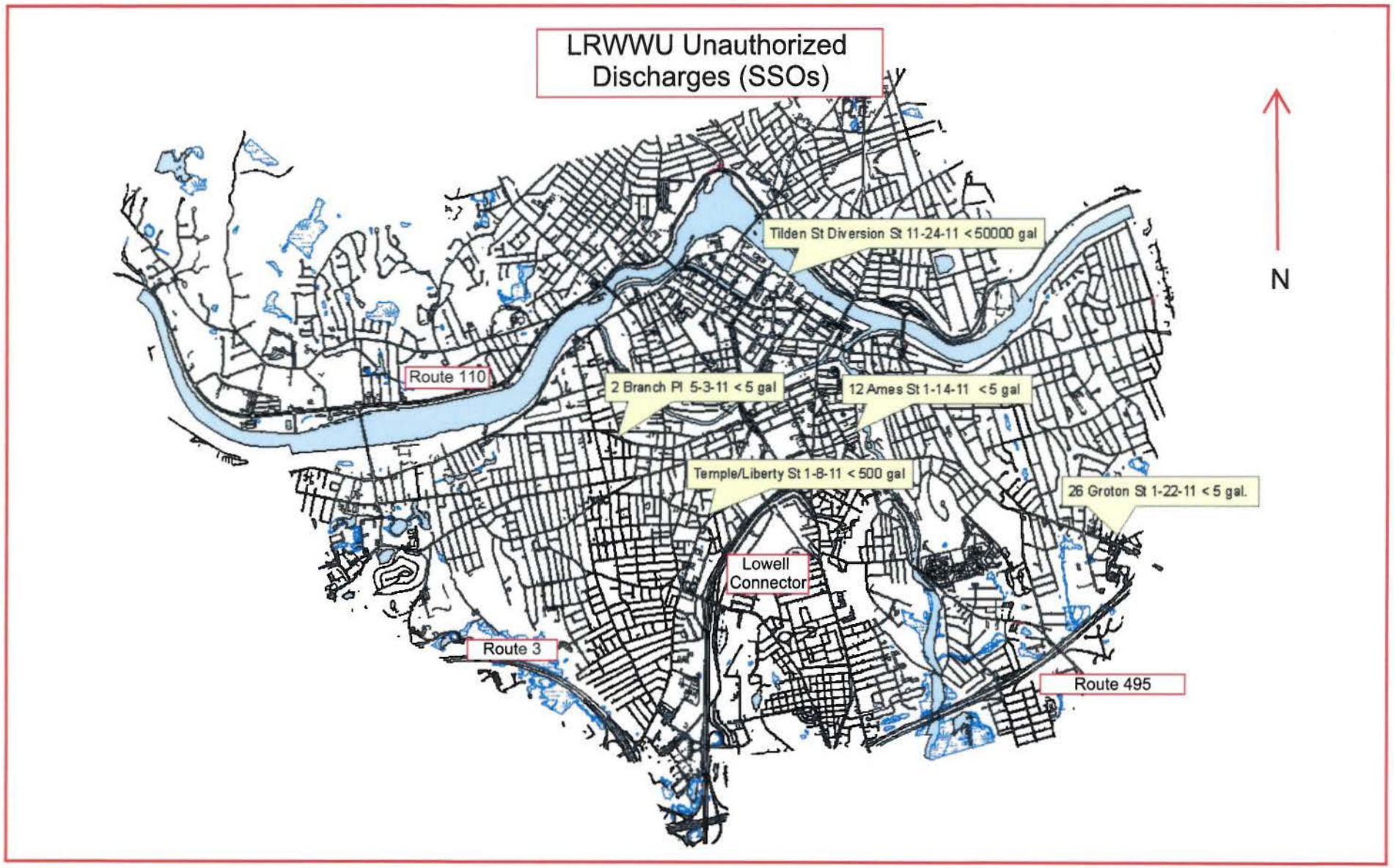
2012 LRWWU Annual Report

2011 LRWWU Unauthorized Discharges (SSOs)

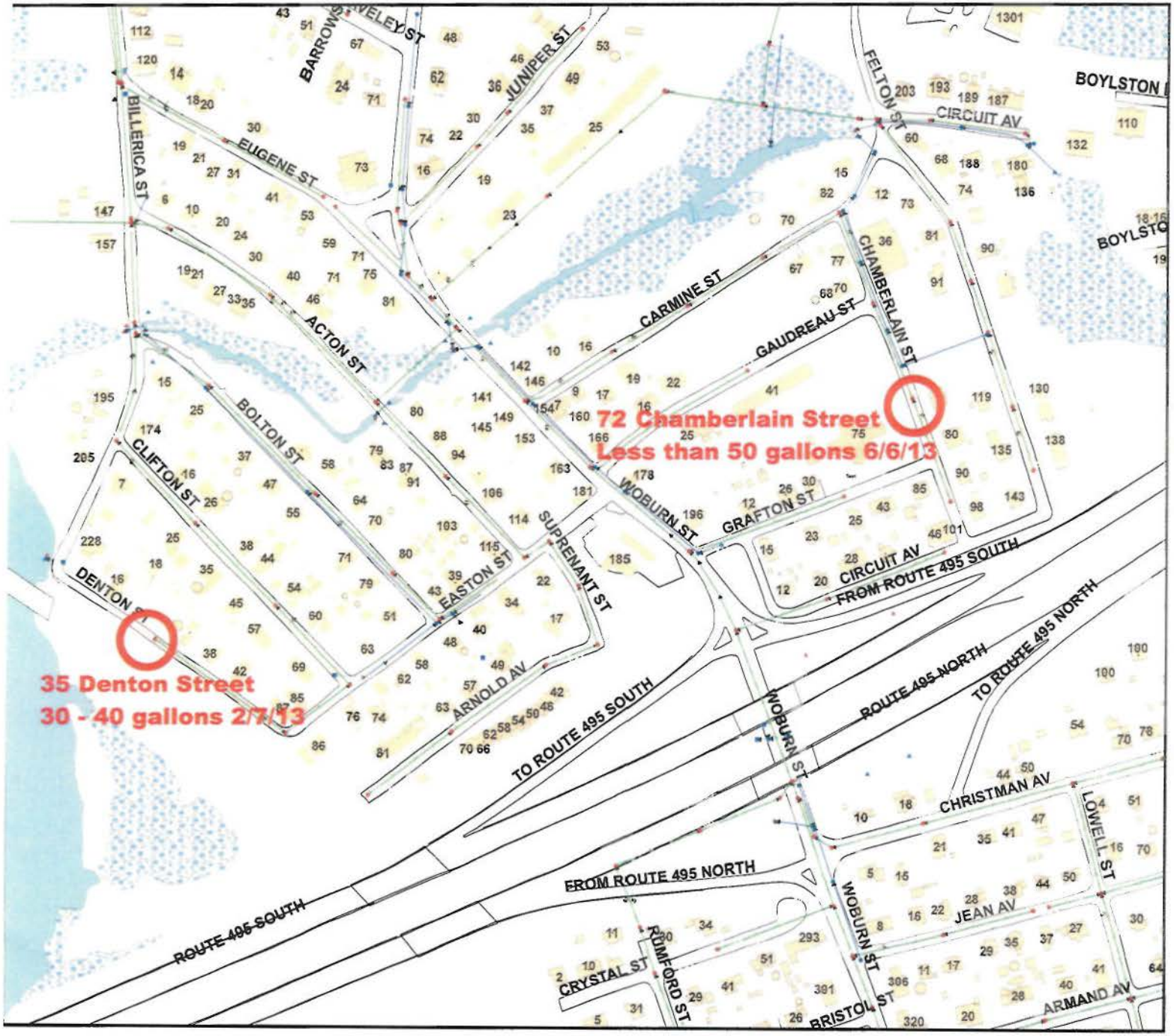
Location	Date and Time	Source of Notification	Cause	Estimated Discharge Volume	Ultimate Fate of Discharge	Mitigation Measures
Intersection of Temple and Liberty Street	1/8/11 7:56pm	Lowell Police Dept.	Vandalism	Less than 500 gallons	Overflow was discharged to the sewer collection system	LRWWU cleared the obstruction in the sewer manhole and verified system integrity. No additional complaints have been received.
12 Ames Street	1/14/11 2:45pm	Resident	Sewer main blocked	Less than 5 gallons	Sewer collection system	LRWWU cleared the sewer main of the blockage. No additional complaints have been received.
26 Groton Street	1/22/11 3:46pm	Resident	Heavy grease in sewer main	Less than 5 gallons	Sewer collection system	LRWWU cleared the grease obstruction and verified the system is functioning properly. No additional complaints have been received
2 Branch Place	5/3/11 2:40pm	Resident	Sewer main blocked	Less than 5 gallons	Sewer collection system	LRWWU cleared the sewer main of the blockage. No additional complaints have been received.
Tilden Street Diversion Station	11/24/11 7:29 am	SCADA Alarm	Pump failure	< 0.07 MG	Merrimack River	LRWWU repaired the Scavenger Pump and confirmed the system is functioning properly. No future failures are anticipated.

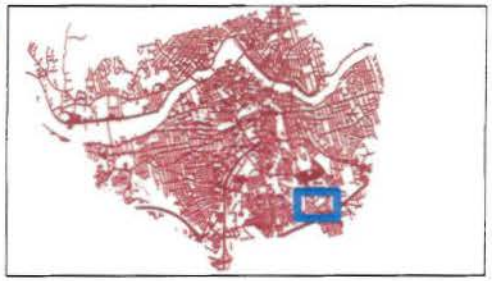

LRWWU Unauthorized Discharges (SSOs)
Tilden St Diversion St 11-24-11 < 50000 gal
N
Route 110
2 Branch Pl 5-3-11 < 5 gal
12 Ames St 1-14-11 < 5 gal
Temple/Liberty St 1-8-11 < 500 gal
26 Groton St 1-22-11 < 5 gal.
Lowell Connector
Route 3
Route 495

2013 LRWWU CMOM Annual Report

2013 LRWWU Unauthorized Discharges (SSO's)

Location	Date and Time	Source of Notification	Cause	Estimated Discharge Volume	Ultimate Fate of Discharge	Mitigation Measures
35 Denton Street	2/7/13 8:28 am - 10:00 am	Resident	Frozen force main	30-40 gallons	Ground surface (no release to surface water)	LRWWU repaired the forcemain, cleaned and disinfected the area. No additional complaints have been received.
72 Chamberlain Street	6/6/13 9:36 pm – 10:51 pm	Resident	Sewer main blocked	Less than 50 gallons	Into Property Basement.	LRWWU cleared the sewer main of the blockage. Discharged backup to sewer. Cleaned and disinfected basement. No additional complaints have been received.





GIS

City of Lowell Massachusetts

LRWWU Unauthorized Discharges SSO

- Sewer Manhole
- Drain Manhole
- Drain Catch Basin
- Sewer Force Main
- Sewer Gravity Main
- Drain Pipe
- CB Lateral
- Outfall GPS
- Roads
- Building

Waterways

Type

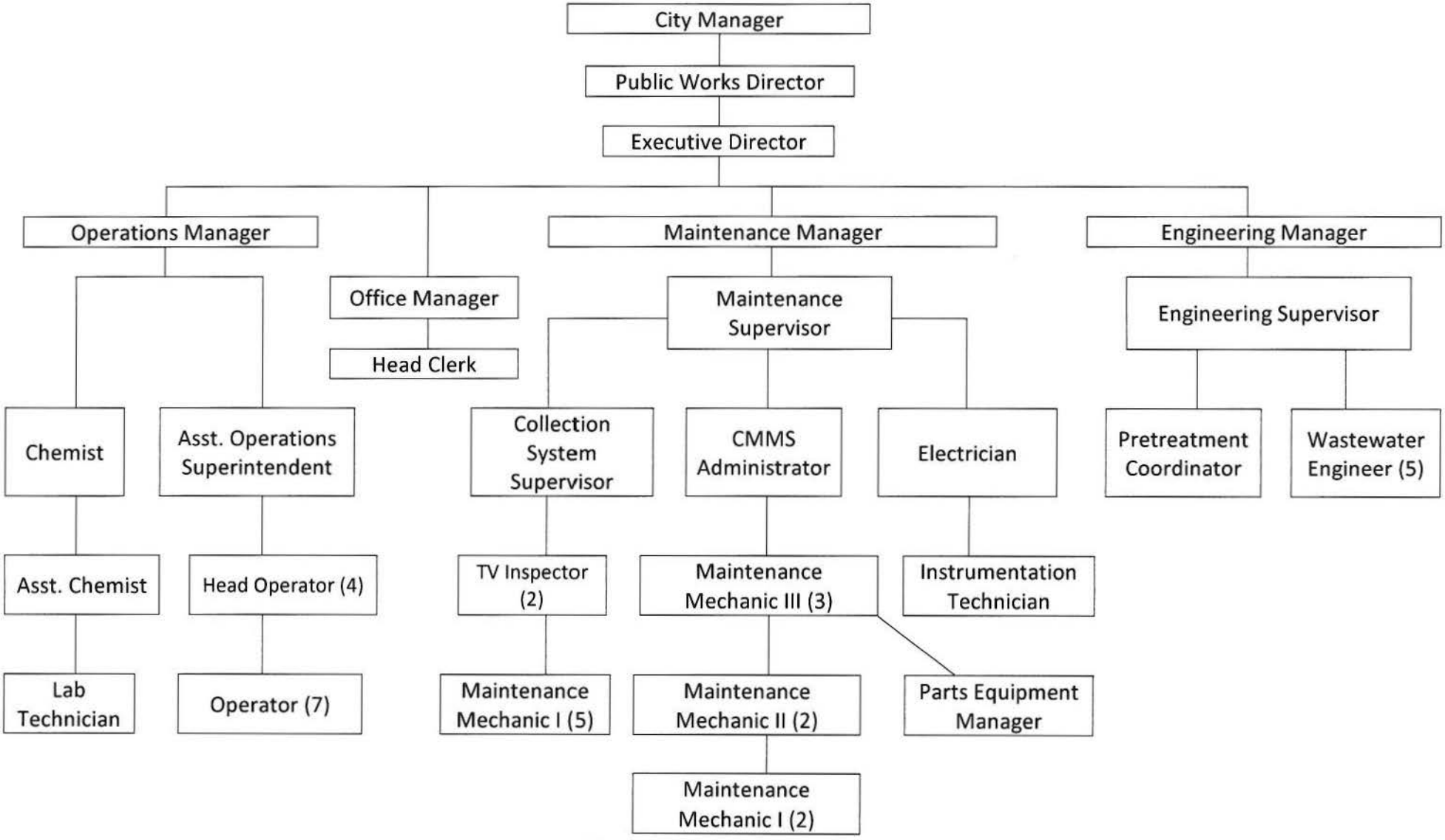
- Pond
- River
- Wetlands

1 inch = 104 feet

Date: 4/1/2014

EXHIBIT A

Lowell Regional Wastewater Utility
ORGANIZATIONAL CHART



Bernard F. Lynch
City Manger

Mark A. Young
Executive Director

Effective March 15, 2013

LOWELL REGIONAL WASTEWATER UTILITY

LONG TERM CONTROL PLAN

ANNUAL PROGRESS REPORT

LOWELL REGIONAL WASTEWATER UTILITY

April 2014

Overview of LTCP Activities During Past Several Years:

In 2011, LRWWU completed an eight-year, $50 M sewer separation program that was a critical element of its LTCP Phase 1 Program. As part of the Phase 1 sewer separation program, more than fifteen miles of new drainage pipes were installed in the City of Lowell. This new infrastructure allowed the removal of public and private inflow in several hundred acres of combined sewer basins. Another eight miles of sewer lines were rehabilitated to reduce Infiltration/Inflow (I/I) into LRWWU's combined sewer system.

In addition to sewer separation, LRWWU also invested in nearly $40 M in capital improvements to its Duck Island WWTF and several key diversion stations along the large-diameter interceptor system. Improvements enabled more effective storage and treatment of wet-weather flows that historically would have been diverted as CSOs into nearby receiving streams.

Interim High Flow Management Plan:

In order to optimize the storage and treatment of wet-weather flows, LRWWU invested in its capability to remotely control and monitor gates, valves, and pumps through its SCADA system. In addition to equipment at the Duck Island WWTF, LRWWU enabled remote monitoring and control at seven diversion stations along the interceptor system. LRWWU developed wet-weather protocols to control operations at both the diversion stations and the Duck Island WWTF.

These improvements and protocols are detailed in an Interim High Flow Management Plan (HFMP) that was submitted to the regulatory agencies in March 2011. The Interim HFMP describes the substantial efforts undertaken by LRWWU to improve its wet-weather operations. The improvements and protocols focus on the philosophy that an aggressive approach to wet-weather storage and treatment could be enabled once the transport and treatment system's response to wet weather conditions was better understood.

A two-year initiative to characterize the system's wet-weather response yielded the understanding that allowed LRWWU to implement a "safe-storage" strategy that features optimal gate control and maximum storage in the interceptor system. Interceptor gate control has been optimized by the implementation of automatic gate control at two key diversion stations – West and Merrimack – based on conditions at the Duck Island WWTF. This automatic gate control balances flows at the WTTF with storage in the interceptor system, so that maximum treatment capacity and interceptor storage are achieved.

The Interim HFMP also identified a significant opportunity to increase interceptor storage by installing in-line gate control at Read Station. Once completed, the Read Station Storage Project will create almost one million gallons of additional in-line storage during wet-weather events. Local funding for this project has been secured and an implementation plan has been developed. At this time, the plan is to begin design of an integrated interceptor storage and flood pumping project at Read Station in 2015, with construction commencing by the end of 2016.

The Read Station Storage Project represents the last substantial opportunity to improve utilization of existing infrastructure for wet-weather storage and treatment. Future wet-weather projects will feature new infrastructure – such as pump stations, drainage systems, larger siphons and conduits, and treatment and storage facilities.

WWTF Wet-Weather Capacity:

Further evaluation of the Duck Island WWTF's capacity to treat wet-weather flows is necessary to maximize treatment during rain events. LRWWU and its consulting engineers have been studying the WWTF's primary and secondary treatment capabilities, both during high-flow and average-flow conditions. This evaluation has included a hydraulic grade line (HGL) analysis, secondary clarifier stress testing, hydraulic and solids loading assessments, and flow-and mass-balancing calculations.

A preliminary evaluation has been completed, with findings indicating that peak flows for reliable primary and secondary treatment are 110 MGD and 60 MGD, respectively. The WWTF's Sodium Hypochlorite disinfection system has been recently upgraded by adding "pre-chlorination" of secondary bypass flows upstream of the Chlorine Contact Chambers. Since this upgrade was completed within the past year, the benefits of this improvement are unknown at this time. LRWWU will evaluate the impact of this improvement and provide an assessment in the near future.

In the meantime, recent upgrades to the influent pumping system and the aeration system, intended to substantially improve the reliability of the treatment process during wet weather conditions, have yielded mixed results. The new pumping equipment has experienced several failures, leaving the Duck Island WWTF less capable of consistently treating high flows than previously anticipated. Meanwhile, several of the new ultra-efficient aeration blowers have experienced a catastrophic failure. These system failures have impacted LRWWU's ability to consistently maximize wet-weather flow through the Duck Island WWTF.

LRWWU has been diligently working with its engineering consultants and equipment vendors to ensure that reliable treatment of wastewater, particularly during high flow conditions, is consistently provided by the Duck Island WWTF.

Interceptor System Plans and Assessments:

In order to support the evaluation of storage and treatment facilities, LRWWU completed revised drawings of its entire interceptor system. Plan and profile drawings for almost 40,000 linear feet of large-diameter pipes – ranging from 48" to 120" – were crafted in 2012. These drawings update existing information and provide a useful resource for future projects along the interceptor system.

Another initiative involving the interceptor system was initiated in 2012: the assessment of all large-diameter pipes alongside the Merrimack River, the Concord River, and Beaver Brook. Through this project, inspection of the entire interceptor system will be accomplished using video cameras and visual observation. Video inspection is intended to identify any defects that may compromise the structural integrity of this critical infrastructure. As importantly, the inspections will also identify any defects that allow the inflow of stream water into the interceptor pipes, a scenario that has been suspected during high-level stream conditions in the past.

In-house inspections have been completed for several thousand feet of interceptor pipes. If necessary, a contractor will be hired to complete inspections that cannot be done using in-house staff and equipment. Depending upon the results of the inspection program, a meter isolation project may be implemented to augment the inspections. Once deficiencies have been identified, they will be prioritized according to severity and corrected as soon as practical. This initiative will continue into 2014 and beyond.

Lower CSO Discharge Volumes:

The combination of sewer separation, sewer rehabilitation, improvements to the diversion stations and WWTF, and an updated HFMP has resulted in markedly lower CSO discharge volumes in recent years. CSO discharge data for 2013 illustrates that this downward trend of lower annual CSO discharge volumes is continuing. In 2013, the annual CSO discharge volume to local waterways was approximately 200 MG.

This amount is approximately70% less than the average annual CSO discharge volume over the past nine years (635 MG). Furthermore, the frequency of CSO diversions remains lower than in the past, with diversions occurring on 28% of the total number of precipitation days. This compares quite favorably with the nine-year average of 34% occurrence.

Sewer System Metering and Modeling:

In 2012, LRWWU embarked on the development of an LTCP Phase 2 Plan. From April through August, twenty-three sewer meters, three groundwater gauges, and one rain gauge were installed in LRWWU's collection system. These sewer meters characterized flows in LRWWU's combined sewer system during varying flow conditions. Data from this project, which was collected on a weekly basis, will be input into a sewer system model that will predict system responses to a variety of rainfall conditions.

The sewer system model, which will inform LRWWU's plan for CSO elimination in its LTCP Phase 2 program, has been developed by CDM Smith. LRWWU has committed more than $1 million towards this metering/modeling project, with the intention of using this model to identify cost-effective solutions that would remedy capacity restrictions in the collection and treatment systems. The solutions for these restrictions will likely be a combination of satellite storage, satellite treatment, sewer separation, and WWTF upgrades.

The LTCP Phase 2 Plan will prioritize these solutions based upon costs and benefits.

LTCP Phase 2 Plan:

LRWWU has completed substantial work on its LTCP Phase 2 Plan for the elimination of CSO discharges. After a six-month delay, LRWWU's LTCP Phase 2 Plan will be submitted to the regulatory agencies in June 2014. In 2012, a sewer system metering project was completed. Data from this project has been input into the sewer system model, leading to predictions of system responses to a variety of rainfall conditions. These predictions, their usefulness, and their limitations, will be presented in the LTCP Phase Plan.

The sewer system model has informed LRWWU's plan for CSO elimination in its LTCP Phase 2 program, helping to identify cost-effective solutions that would remedy capacity restrictions in the collection and treatment systems. The solutions for these restrictions are a combination of satellite storage, satellite treatment, sewer separation, and WWTF upgrades.

The LTCP Phase 2 Plan will prioritize these solutions based upon costs and benefits. It is important to note that the planned solutions will be implemented in a phased approach. This way, LRWWU will understand the incremental benefits of each improvement before embarking on the next phase of improvements. This approach will ensure a cost-effective program that strives for CSO elimination while also carefully investing precious local funding.

One of the interesting features of LRWWU's LTCP Phase 2 Plan will be balancing wet weather flows from both sides of the Merrimack River. Constructing new storage/treatment facilities on one side of the river will allow for the transmission of more flow from the other side of the river to the Duck Island WWTF.

Another important aspect of the LTCP Phase 2 Plan will be identifying certain siphons where it makes sense to increase their capacity, thus allowing for more flow from the upstream basin to be transmitted downstream to the Duck Island WWTF. Again, this approach will need to be balanced with other storage and treatment facilities.

LRWWU's LTCP Phase 2 Plan will also feature strategic sewer separation projects that will relieve constrictions and reduce CSOs, while also addressing local surcharging. LRWWU plans to incorporate several stormwater infiltration components into these projects, including "green street" improvements.

Anticipated LTCP Activities:

In October 2013, LRWWU received funding authorization for another $40 M in capital improvements, $33 M of which is earmarked for collection system improvements. Those funds will be utilized to construct new drainage (sewer separation), create new wet-weather storage facilities, and rehabilitate existing sewer lines.

In the next year, LRWWU will embark on a sewer separation project in the Tilden Basin. This collaborative project with UMass-Lowell will reduce wet-weather flow to Tilden Station, which was the most frequent CSO discharge station in 2013. LRWWU will also begin design and construction of a sewer relief pipe for the Marginal Interceptor, a critical sewer main that is overwhelmed with wet-weather flow.

Shortly thereafter, an in-line storage project at Read Station will be initiated. This project is the final piece of a strategy to fully utilize existing infrastructure before building new treatment or storage facilities. LRWWU has already completed preliminary design of new flow-control gates at Read Station, and has secured local funding for this project. LRWWU now anticipates that this project will begin in 2015.

All of the initiatives described above are part of LRWWU's LTCP Phase 2A program. This program will include an interceptor storage project at Read Station, targeted sewer separation projects, strategic upgrades to the WWTF, and the completion of an LTCP Phase 2 Plan. The Phase 2A program will be the first phase of LRWWU's LTCP Phase 2 program, the extents of which will be defined in the LTCP Phase 2 Plan to be submitted in June 2014.